

LOS ANGELES COUNTY MUSEUM OF HISTORY • SCIENCE AND ART
EXPOSITION PARK • LOS ANGELES • CALIFORNIA

August 24, 1942

Dear Dr. Howard:

At Thursday's meeting of the Board of Governors, I expressed my sincere appreciation of the work of the staff in assembling the exhibition AUSTRALIA.

The Board of Governors requested me to convey to you their thanks for the cooperative spirit shown in aiding in the projection of such a significant exhibition.

Sincerely yours,

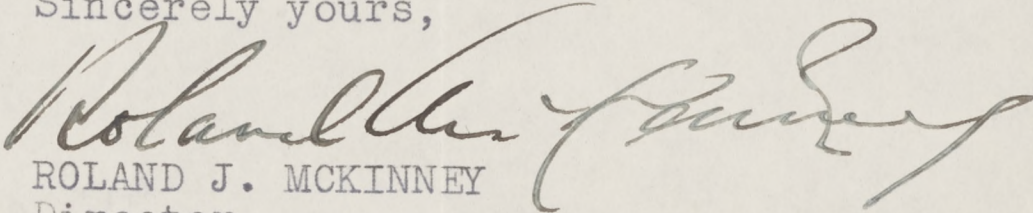

ROLAND J. MCKINNEY
Director

Exhibit south meszgerine Marsh, 1947

Oligocene case (10)

Oreodon material (L1221)

Merycododon culbertsoni (no. 31) Chadron, Nebraska skull

Oreodon (no. 3847) "

2 specimens Oreodon (no. 188 and "O. major PLS 12.06") "

2 bones Merycododon (no 3610) skull, 3 frag. legs, 2 parts tarsals, 1/2 of sternal
Badland Cr., Nebraska
"Quintadactyl" - (no. 1062) skull, jaw, 3 leg bones

White River mammals - bones from Calif. Instit. Tech.
3/24/47

^{nebrascensis}
Hyracodon 33-27 (skull & jaws)

Camel $\frac{143}{1599}$ 26.30

Hoplophonus $\frac{143}{1584}$ 115.30 skull

Dinictis $\frac{143}{1458}$ 148.30 skull

Cynodictis $\frac{85}{621}$ skull & jaw in jaws

Retired from exhibit 10/19/51
Howard

L1221 ret'd to basement

Cal Tech material & returned

So. mezzanine fossils 3/20/47

Mio. Mammal Case (11)

Boston mammals

Procaninus 2 canini, & frag. of upper tooth row,

Meryclippus calamarius upper & lower jaws, femur tibia

Merycodus ~~stans~~ acator. lower jaw & antler

Tanaisius skull

Deer-like mammal - 1 caninus & upper tooth row

Desmostylus

Frag. of skull (2) and numerous teeth (27) (15108
and 1 frag. of tusk (2332))

Desmostylus $\frac{1,020}{980}$

South mezzanine fossils

March 1947

Thiara Birds (12)

Puffinus diatomicus from San Francisco

Phalacrocorax femoralis from Calabares (CAST)

Sula archibutei from San Francisco (CAST)

Megazine Fossil Exhibit

March 1947

Miscellaneous Plants (13)

A 1011 Seaweed in diatomaceous earth Alhambra

A 1920 " " " " (Calabasas)

A 1323 " " " " Alhambra (Sierra Vista)

L 36-6 = A 6 " " " " " "

A 6 - El Modena & Alhambra leaves in diatom. earth

2 unknown 5 oaks

1 sycamore? 4 avocado

A 1907 Sycamore leaf (Sta Monica Mts.)

A 4722-1 Palm frond in pebbles Sulphur Mts.

A 2729 Gustin Quarries palm frond

L 1887 Percy Train collector 22 leaf (or seed) impressions
(8) Mt Spruce Red Cedar (17) Spruce seed (21); Red Fir seed (18)
Madrone (5); Willow (16); alder (3) 6 oak leaves & an acorn

✓ 14-15, 13, 7, 10-11, 22; Aspen (9); Oregon grape (2)

Bl. Walnut (6?); Service Berry () Box Elder (20) Maple seed (19)

Sierra Maple (1); Chinese Maple (21)

South mezzanine Fossil exhibit

March 1947

Miocene fishes (14)

Sarda stocki (Type)

Sygnathus acus $\frac{1031}{1056}$

Xyprichthys (Lamprea $\frac{1028}{1021/1022}$; and 2 others)

Etrungus scintillans with sea weed (Sta. Monica Mss. L 1724)
John Behrmer)

Lampanyctus sp. *bolini* (2) $\frac{1030}{1045}$ r $\frac{1039}{1205(?)}$ (5 photo of scale from the David)

Xyprichthys sp. $\frac{1029}{1037}$ El Modena

Herring scales $\frac{1030}{1129}$

Shad scales $\frac{1032}{1241}$ and 50 others

Several scales on matrix of *Thyrsochlamys kneri*

Scales of *Etrungus*

Xyprichthys (several on plaque) $\frac{1027}{1020}$ A2673 Alhambra

Routh mezzanine

Fossils

March 1987

Miscellaneous Invertebrates (15)

Ostrea vesiculii 4

Ostrea titan 2

Mytilus 1

Pecten boweri 1

Pecten stellatus 1

Pecten (sp?) 2

Crabs on matrix

Dosinia ponderosa

Chione tentaculata

Saxidomus, sp.

Palinurus sp. (2) from San Benito River

Turritella oregonensis 5

Palinurus sp. 12 from Montgomery Ranch

Palinurus rock from Sulfur Mt. Ranch

Solenaster (coral) from Coyote det. (Stemmerberg coll.)

South mezzanite fossils

March 1942

Placene plants & invertebrates (16)

Last Chance Canyon wood

3 pieces petrified wood, sp.?

2 " " yellow wood

Mt. Eden formation

Seeds of *Prunus preaucleroni* (2)

Prunus preaucleroni (2)

Juglans beaumontii (12)

Cones & bracts of Dyer & Coulter pine (7 cones, 7 bracts)

Cones (2) of *Pinus pretuberculata* - types 1 } total 4
cone 2 of *Pinus* ^{not types} *primacarpa* (6)
Pseudotsuga ~~primacarpa~~

Invertebrates from 4th & Broadway

Haliotis corrugata

Crepidula princeps

Yasmer ~~barbarens~~

Natica alutice (2) RARE

Lucina acutilineata (2)

Ostrea erici (2)

Cardita ciliolata (8)

Antiplanes perversa (3)

Pecten riverii RARE # 1 good, 2 frags.

Pecten hindsi (3)

Pecten hericens (3)

Pecten bellus 2

Pecten healyi 2

earth megafauna fossils

March 1947

Deadman's Island (17)

Pliocene

Fossiliferous rock

Tagula montereyi 2

Pecten caurinus 2

Lower Pleistocene

Fossiliferous rock

Prothaca staminea 2

Saxicardium cuneifolium 2

Fusitriton oregonensis

Megascyrcula carpenteriana

Norisia norisii

Turritella jessetti 2

Lucina acutilineata 3

Tellina bodegensis 4

Upper Pleisto

Platydora cancellata 2

Cardium procerum 2

Olivella biplicata 4

Chione undatella 2

Petricola carditoides 3

Corvus californicus 4

Chione fluctifraga 2

Tagelus californicus 2

Protheca staminea 2

South mezzanine fossil

March 1947

Upper Pleistocene Invertebrate (18)

from Main & Lomita excav.
Sec. 77

Mellita longifissa about 15'

Dendroste viscidoseus many

Dosina ponderosa 4

Pecten stearnsi 1

Macrocallista aurantiaca 1

Petricola pholadiformis 2

Cardium elatum, 1

Cardium procerum 2

Schizothaerus nuttallii 4

Mass of misc. fossils

Vertebrate

3 rays

1 vert.

4 misc. bones

South megaline fossils

March 1947

~~Salween~~

Cocaine Case (9)

Mammals L1221

Dolichorhinus - skull

Protoreodon - ant. half skeleton

Green River fresh water FISHES

Notogonius osculus (Goss. coll.) from fossil, Wyo.

framed piece (7 photo of scale of related form from Washington - Lore David photo)

Miplotus labracoides - Peab. 1904 $\frac{1044}{1324}$

Prisacara sp. (Peab. ltr Fish) (L.B. Parsons Donor) from fossil, Wyo.

Knightia evaena (loan from Mrs. Leach E. Hanson)
(related to Double-armed herring)

Diplomystus sp. (Double-armed herring) - a large, & a small specimen framed,
A 3241 (one a loan from Mrs. Jennie Walters - large one) The other A 1488 $\frac{1037}{1186}$

A 3241

Diplomystus dentatus

Phaeodus acutus (related to *Heterotis* of Africa) A 5086 - ?
given by Mr. Jack S. Sessler (from No. 9 Hammer, Wyo.)

Invertebrates - San Diego, Calif. (P87)

$\frac{26}{59.22}$ - *Architectonica hounsi* - Rose Canyon, La Jolla

$\frac{26}{979}$ - *Surcula sinuata* - San Clemente Canyon (3 specs.)

$\frac{26}{943}$ - *Loxotremata turrita*, Ocean Beach (3 specs.)

$\frac{26}{999}$ - *Cylichna costata* - San Clemente Canyon (2 spec.)

$\frac{26}{868}$ - *Solen novacula* - Rose Canyon

$\frac{26}{957}$ - *Macrocalista conradiana* - San Clemente Canyon

$\frac{26}{950}$ - *Crassatellites grandis*

South mezzanine Leslie

March 1947

Mesozoic Reptiles (7)

Dinosaur

27 foot bones

11 mice.

57 vertebrae (+ some of the mice. are vert.)

Many Tooth frags. A904

10 jaw frag. (+ some tiny pieces), A904

Phytosaur

9 teeth + matrix with teeth

Fossil fish 3 pieces from Lore David Cornell Univ.)

Crocodyl teeth - many

Turtle carapace frags many

Mesozoic Birds - (8)

CAST Archaeopteryx lithographica

CAST Archeornis siemensii

South Merzgamme fossil exhibit March 1947

Mesozoic Invertebrates Case (6)

~~Echinoderm~~
~~Anachytes orata~~

S. 1357; S. 2049; S. 1403 (2 spec.)

Epiaster whitei

A 4890 (5 specimens) (Hemistera sp.)

Pelecypoda

A 4890 (Ducardina browni) (Trigonia dausoni-2)

A 3581 (Exogyra ponderosa)

A 1477 (Ducardina sp.)

S. 8486

A. 1810 (2 Coralliophila)

and 9 misc. from Mina Nevada

Gastropoda

A 5076 (Orthonema) (Trochus magnus)

S. 8477 (3 specimens)

Rosebud Co, Montana A 1657 (12 specimens)

3 ammonites (A 1657-1)

2 gastropods (A 1657-7)

3 Ducardina (A 1657-5)

4 clusters of misc. shells, (A 1657-2)

Bel. Air (A 2193) (16 specimens) St. Monica Mts. Chino Co. Cal.

1. Glycymeris

2. Cucullaea yongii 3. Trigonia eversana

* 4. M. Ceph. case (series of ammonites)

5. Placenticeras (2 spec.) 6. Gyrogonia

7. Cinulidia

8. Crassatellites 9. Meretrix

10. Ducardina pentatoni

11. Ducardina 12. Baculites

13. Turritella

14. Cucullaea truncata 15. Cucullaea

16. Tellina

Laburno Canyon (A 2124 and several other accessions)

Pelecypoda 10

Gastropoda 17

Ammonites 4

and 1 cluster of misc.

Trinacria cor

Pecten

area

Thurstonia zeta

Cardium?

Trigonia

Eugenia shumardiana

Amphipoda packardii

Actinoptera

Turritella

Corvus ???

Ammonites

St. Monica Mts.
Orange Co. Calif.
Chino Co. Cal.

Cephalopod Case — (5)

- L1221 Ammonites - 17 plaques and 3 off the plaque (Entelerochoceras)
(12 Scaphites nodosus)
- L194 L.W. Parker So. Dakota Badlands (7 of graduated sizes in 2 series (3 r 4)
- 4 large Scaphites nodosus (2 have no data, and A1932-25; A5499-55)
- Series of 10 graduating in size, Placenticeras (~~A~~ A2193-4)
- Large Placenticeras, C.F. Hedges donor (no number)
- Rock nodule in 2 pieces showing contained Ammonite
- A5499 Ammonites placenta
- A462 2 cast of ammonites from Denton, Co. Texas
- A1477 4 fragments Baculites
- A1657-3 (4 pieces Baculites)
- A1488 (2 pieces Baculites)
- * A372 Belemnites teller sheath
- A1432 Belemnite sp. " "
- A1767 " sp. (tiny ")
- A1488 " minimus
- A3226 " sp. 3 pieces from chalk cliffs, Belgium
- A5714 " sp 2 specs. (Mrs. Egli)
- * Restoration drawing to accompany specimen of B. teller
Done in color by Arminda Deal (Gratis - March 3 and 10)
Color suggested by pictures in National Geographic magazine

South mezzanine

Fossil

March 1947

Mesozoic Plants (4)

Cycad leaf-impressions said to be from Guatemala (1)

Araucaria wood from petrified forest, Arizona (2)

6 slabs of A 1657 from Garfield Co. Montana Cretaceous

5 pieces petrified wood (Triassic?) from Nevada

South mezzanine fossils March 1947

Paleozoic Plant Case (3)

Mazon Creek ferns in nodules

7 separate halves Neuropteris (A780-6, A780-7, A780-; A121, A1657-⁶⁵₆)

13 " " Pecopteris
(A780-9; A780-13; A780-11; A780-12; A1405-9; A6;
A3373-7; A1932-4)

Ferns from Pottsville L1405-1, X and 3 and L1405 (no number)
A1488-1, 2, (and 3), 4
(2 spec.)

Phenophyllum A1488

Calamites stems 4 and 2 halves of nodules
(A323, 1 spec., nodule A780-10, others no numbers)

~~Calamites~~
Annularia, 5 halves of nodules
A1405-5; A3373(2); .1809(2)

Sigillaria trunk fragments
4 of L1405, 1 of A1488-167

Lepidostrobus - 3 specimens L36 (= A6 now)

Lepidodendron frag of trunk A1488-162

Lycopod stems (6 fragments A6 from Stuart Jones)

Stigmaria - 6 pieces (A476, A323, A1488-171
A1932-32; .629; A6)

Cores & photos from Lore David

2 cores, 1 photo *Etringus saucianus*

3 cores, 1 photo from paper *Etringus scintillans*

2 photos *Gaudyia* (specimens belong to Mus. rare not
cores 1050, 1032 (4 spec.))

1 core, 2 photos of croakers

1 photo *Macrurus zemmorianus*

2 photos of *Maia* of upper Eoc. Pac. coast

Parapoly mixia

Paranorone eocenica

Forams from 4th Hill - La Mesa coll. P. D. Cune

March 4, 1947

TO: Mr. Breasted

FROM: Hildegarde Howard

SUBJECT: Request for written plans for special science exhibits in the Museum.

Dr. Stock has already spoken to you of these plans, but as he is ill in bed at present, may I present this written notation as a temporary measure, until he is able to do so himself?

Plans for a combined renovating of our mezzanine fossil exhibits and an added special exhibit on the occasion of the meeting here of several geological societies about the 20th of March.

1. Renovation of the mezzanine fossil exhibit on which Mr. Wylde and I are now at work aims at the presentation of life of the various geological eras in an orderly (though, unfortunately very scant for the earlier eras) fashion.
2. Special exhibits which we hope to add are:
 - a. An exhibit (possibly 6 cases) of the Newport Bay material which Mr. Kanakoff has collected in such abundance, and which because of its unusual completeness should be of particular interest to these visiting geologists.
 - b. An exhibit of oil cores, and foraminifera and fish scales (as important index fossils to the oil geologist), and other included fossils (of interest to the paleontologists). Some of this material is available here, some we expect to obtain through the cooperation of one of the oil companies.

It has been our hope that the cases of modern shells and reptiles could be moved to more appropriate places in order to have the entire south mezzanine given over to earth sciences at this time. The plan was to have the shells and reptiles moved over to the north side as the minerals were moved into the old science rotunda. This would put all modern biology (miscellaneous materials) on the north, and earth sciences on the south.

This entails a manpower problem, and on the success of solving that problem hinges the success of this exhibit for the visiting geologists -- and also the reputation of Earth Sciences in the Museum.

Respectfully yours,

Curator of Avian Paleontology

R I C H F I E L D O I L C O R P O R A T I O N

R I C H F I E L D B U I L D I N G . L O S A N G E L E S . C A L I F O R N I A

Box 470, Long Beach, California

10 March 1947

Prof. Chester Stock
Calif. Inst. of Technology
1201 E. California St.
Pasadena 4, California

Dear Chester:

At the moment I find myself very busy, with three papers to prepare for the coming meetings, so I am afraid that the time I can devote to your project will be very limited.

As to some possible exhibits, I might suggest that you borrow the large plate which hangs in Mr. Eckis' room and which includes greatly enlarged photographs of various foraminiferal species. In addition to this plate I have several showing enlargements of fish scales. I have a few extra copies of my Catalina chart which could be mounted on the wall. Other than these contributions I can't think of a thing that the museum doesn't already have. Please let me know if you can use these items, and I will see that they are made available.

With kindest personal regards, I am

Sincerely yours

M. L. Natland
M. L. Natland

MIN:hp

REMAINS OF FISHES FROM THE SHALES OF GREEN RIVER.

From "Leidy's Vertebrate fauna of Western Wyoming Territory", 1873

In Professor Heyden's preliminary Report on Geology of Western Wyoming for 1870, p. 143, the author remarks that soon after leaving Rock Springs Station on the Union Pacific Railroad, the Green River Group is seen on the bluff hills on the other side of the road to the entrance of Bitter Creek into Green River. In the valley of the latter, remarkable sections of the strata are exposed to view. The group he calls the Green River Shales, because they are composed of thin layers, varying in thickness of from that of a knife-blade to several inches. The rocks all have a grayish buff color on the exposure, sometimes with bands of dark brown. These darker bands are saturated with bituminous matter which renders them combustable.

About two miles west of Rock Springs there is an excavation on the railroad which has been called Petrified Fish Cut, on account of thousands of beautiful and perfect fossil-fishes are found on the surface of the shales, sometimes a dozen or more on an area of a square foot. Remains of insects and aquatic plants are also found in the shales, and in one case a well preserved portion of a feather of a bird was discovered..

A large collection of fossil fishes from the Petrified Fish Cut was obtained by Professor Heyden in 1870, and was submitted to Professor Cope, who has described the different forms in the report above mentioned.

The first of the fossil-fishes of the Green River Shales was discovered by the late John Evans as early as 1856, and was submitted to the examination of the writer. Several specimens, both buff and colored and the dark bituminous shales containing fossil-fishes have been presented to me by Judge W.A. Carter and Joe Carter of Ft. Bridger Wyoming. Professor Cope described 7 species including one of those described by me from the Green River Shales.

348 W. 162nd St
Pl 2-123

South mezzanine fossils 3/20/47

Cases (from south to north along west wall)

- ⊕ ✓✓ 1. + Paleozoic invertebrates
- ✓✓ { 2. * Paleozoic invertebrates and a few fish teeth +
- ✓ { 3. + Paleozoic plants
- ✓ { 4. * Mesozoic Cephalopods Plants +
- ✓ { 5. + Mesozoic ^{Cephalopods} ~~invertebrates~~ (misc.)
- ✓ { 6. * Mesozoic ^{Invertebrates} ~~Cephalopods~~ +
- ✓ { 7. + Mesozoic reptiles
- ✓ { 8. * Mesozoic birds +
- G & L.D. 1/4 { 9. + Eocene case
2 mammals
fish
invertebrates
- G 1/2 { 10. Oligocene case +
Oreodons
~~Invertebrates~~ White Eocene mammals
- ⊕ ✓ { 11. + Miocene mammals
Barstov
Desmostylus
- ✓ { 12. Miocene ^{Birds} ~~Plants~~ +
- { 13. + Miocene ^{Plants} ~~Birds~~ 26
- A.D. { 14. Miocene fish +
- G { 15. + Miocene Invertebrates
- G { 16. Pliocene (plants & invertebrates) +
- G { 17. + ^{Pradman's Island} ~~Pleistocene~~ (lower) ~~Invertebrates~~
- G { 18. Pleistocene (upper) ^{upper} " +
- G { 19 + ^{Productus} ~~Invertebrates~~ ^{Case} " +

+ = end of case at which case label should go.

South mezzanine

Fossils

March 1947

Introductory Case (19)

Dung from Gypsum Cave

Bone from Barton Mirens

Amphibian tracks from Castle Peak

Leaf impression (41657 - Cret. Montana)

Cast of ^{gastropod} ~~trilobite~~ shell in matrix

2 beetle carapaces from Bliss '29 Pit at Rancho La Brea

Shell from Main + Lomita Pleistocene excavation

South mezzanine

Fossil exhibit

March 1947

Paleozoic invertebrates (1)

- Trilobites**
Flexicalymene senaria 1 (smaller with it doesn't belong there? listed as one of 5 sp.)
Calymene niagarensis (3 spec.) (2 on plaque are L1221)
Isotelus gigas (3)
5 *Trilobites* nos. ? and 2 other pub'l'y *Calymene niagarensis* on label
Isotelus 88.
- Crinoids**
Stemur (4 lower Carbonif. - 4 Silurian, 1 matrix with many frags.)
Heads (2 without data found)
Potassiacrinus 86 and S. 1740 sp.?
Platycrinus hantzschii 1701
- Blastoids**
Pentremites sulcatus (14 on plaque L1221)
Cordonites stelliformes (A1471 S. 7890)
- Bryozoa**
Parasera vetusta (dried) (2 spec. L1221)
Rhombopora lepidodendroides (9)
Achirodes wortheni
Bryozoa & crinoid stems in matrix
- Cords**
Goniophyllum pyramidale (3 spec. L1221)
Streptelasma rusticum (11 spec.) L1221
Complexus sps. (2 big pieces, 1 tiny) (L113)
Pachyphyllum woodmanii
Hexagonia anna
Halyzites agglomeratus
Halyzites catenulatus
Favosites sp(s) & *Favosites sumneri* (L113?)

Brachiopods

Chonetes mesolobus 8

Spirifer cameratus

" *keokuk*

Productus costatus (S. 1934) and (?)

" *horridus* (4 on L1211)

" *cora* S. 7549

Pendameris in matrix (2 pieces)

Acrostrophia verneuilli (5) L1211 } on plaques

Spirifer macropleurus (5) L1211 }

Gypsidula zalcata (9) L1211 }

Atthis argentea (6)

Small silurian Brachiopods in matrix

Spirifer orestes (5)

Bilobites varcus (9)

Dalmanella subcarinata (6)

Spirifer curvatus (3)

Orthis heter umbrae (1)

Leptaena rhomboidalis (6)

Dalmanella elegantula (3)

Orthis fella didyma (4)

Dalmanella testudinaria on 1 plaque 18 on another

Strophomena sulcata (12)

Platystrophia lynx (2) on 1 plaque, 11 on another

Rafinesquina alternata (2)

Dinorthis subaequata (7)

on plaques
L1211

on plaques
L1211

Paleozoic invertebrates & seedhates (2) Iowa (6)

	<i>Petrodus occidentalis</i> (A 535 - 2014) dermus dentich, Iowa	2058	
	<i>Edestus giganteus</i> (up. Carb. shark teeth)	2081	(3 toes)
	<i>Varanopus impressus</i> (Castle Rock Texas)	2081	
	<i>Varanopus (didactylus?)</i>	9	(2 toes)
am.	<i>Microsaurus acutipes</i>		
Rept.	<i>Lagopus wyldi</i>		
	<i>Cochliodont fisher</i> (3 teeth) Stuart, Iowa		
	<i>Petalodus destructor</i> (2 teeth) Iowa		

Cephalopods

- Eudoceras fulgur* A 730
- Cameroeras* sp. S. 6510
- sp. ?
- Cameroeras proteiforma* (L 1221)
- Goniatites* (5) Iowa Dev.
- Curved shelled Cephalopod.
- Orthoceras rushensis* (A 6) in matrix

Gastropod

- Natural cast A 1471
- Euomphalus* sp.
- Devonian gastropods no data (4)
- Platyceras gebhardi* L 1211
- Euomphalus atilloides* L 1211?
- Sphaerodonta primigenia* L 1211?
- Wormeria tabulata* L 1211
- Naticopsis nana*
- Naticopsis torta* L 1211

Pelecypods

- Alloreauma subcuneata* A 6
- Myalina Kansanensis* A 14
- Nacella ventricosa*

Detailed view of face of fossiliferous asphalt lens, showing concentration of material. Because of the abundance of material, it was necessary to remove portions of the lens in large blocks for careful extraction of specimens in the laboratory.

Close up view of fossiliferous asphalt lens. Trenches were dug on both sides to explore the bones.

Field workers encasing block from asphalt lens in plaster jacket before removal to the laboratory.

Looking down exploratory trench 100 feet long by 30 feet wide, by 15 feet deep. Fossil occurrence shown at the lower end, adjacent to highway.

Dragline digging exploratory trench which penetrates eight feet of asphalt overlying exposures of the light-colored Tulare Formation (Late Pliocene-Early Pleistocene age).

Contacts of
Meyzamine (South)
cases before renovation
of fossil exhibit in

1947

Silurian - Kentucky
D. Kentucky
Sweden III
Illinois

Devonian
Germany III
Canada II
Iowa II
Indiana
N.Y. III III III III

Ordovician
Ohio III III
N.Y. III
Indiana III

Miss.
Indiana II
Iowa

Permian
Germany

Cretaceous
France II
So. Dakota III

Jurassic
Germany III
England II
Wurtemberg II
France III

Trilobites
Dev., Ord., Sil.,

Ammonites

Cret., Jurass.

Brachiopods, Corals, Cinnamoms
Sil., Ord., Dev.

all in case
other ammonites, corals, cinnamoms
Permian not given
another case 1 Cret.
ammonites etc.
few small corals
plants (S. Dakota)

Miocene

Desmostyles
camel teeth
Oreodon teeth
shells
frag slabs of fish
palm leaf
crabs
shark teeth (age?)

1 case

{ 1 case all fish - Miocene and? (wyo?)
{ 1 case mid buds (3 slabs
{ 2 cases oil cores (one case shows joints)

[Pliocene - Orizaba & San Pedro 1 case

[Another Miss San Pedro & other Pliocene,
includes 2 bud bones
horse teeth
turtle
Bison phalanx
camel bones & teeth

[Pliocene - Miocene shells la]

North mezzanine

Carboniferous Plants - 2 whole cases

Very Bad Take
1 case of petrified wood, & stuff from Trenton limestone
+ this
later includes trilobites

1 case Dinosaur, crocodile, turtle, (Plesiosaur)
heron
& Canada

1 case fossil insects

Tut amber

Jurassic Solenhofen (Carnegie loan?)

La Brea

Oil exhibit

Keep

5 Charts showing where oil accumulates

Discard Geol. Time chart

6 bottles of oil

Keep ~~74~~¹⁸ cores showing fossils (1 off in left hand upper corner of core + 2 in lower left)

The above cores show just a few of the many interesting things encountered in drilling wells. Occasionally well preserved imprints of leaves & aquatic crabs & small fish are found.

The above cores contain rather well preserved fossils, large enough to be distinguished with naked eye. These fossils aid in determining age of formations drilled thus. ~~Thus it is possible to find same fossil zones can be~~ recognized in wells drilled in dif. localities. One easily recognized fossil bed occurring at a def. dist above the oil sand is often used as a "marker" by oil well drillers when they reach this zone they know exactly how much deeper they must go to reach oil.

core showing dip of ^{beds} banded sandstone "

Core is exactly as it came from well - probably
offset by one bed sliding on another,

Vertical beds

Core showing vert. position of beds. Due to faulting
strata are shakily faulted on end. Puente Hills,

Another case;

Core "oil sand from Meyer Zone
Santa Fe Sp. field,

core oil sand from Cymric field, Kern Co.
at depth 1200 feet - (ammonite shells)

Structural diagrams illus. areas in which
oil accumulates & where the well should be placed to
tap the oil to best advantage.

Remove 3 cases minerals
& shift 1 coral can to north wing.

✓ Crinoid stems in Carbonif. limestone

~~Orophos~~ ^{crinus}

• Cordanites stelliformis

✓ Subcarb. - Burlington limestone Mo.

Bryozoa

✓ Schizotheca wortheni
Dev? Lake Sup.

✓ Bryozoa & crinoid stems in Carb. limestone

✓ Coral & gastropod of Carb. age
Kansas

^{Bryozoa}
✓ Rhombopora lepidodendroides
Carb.

2

Brachiopods

Productus cora in matrix ✓
Carb., Guthrie Co., Iowa

• Athyras argentea
Carb. ✓

Productus costatus
Carb. ✓

Carb + Permian
corals
Brachiopods

Cambrian
anything

Silurian
Brachiopod

Trilobites

Halysites
Chain corals
of the Silurian L113?

^{carb. coral colony}
Hexagonia annulata
Devonian
L113?

Brachiopod
Chonetes mesolobus
Guthrie Co., Iowa
M. Carb.

Shark

Edestus giganteus
Carb. (Pa.)

~~(Dorsal spines)~~

✓ Small ~~Silurian~~ ~~Carb.~~ Brachiopods in matrix

Carb. Gastropod c.
Trenton Limestone, ^{Louisiana} Mo.
Silurian

Spirifer orestes
Silurian ✓
Whitewater, Indiana

Honeycomb coral
L113

L113: Favosites
Honey comb corals
of the Silurian + Devonian

Brachiopods in matrix
Pentamerus
Maquoketa river
near Monticello, Iowa
Devonian L113

✓ Amplexus
several species of cup corals
of the Early Paleozoic

Gypidula galeata
Dev.
Aetnam, N.Y.
Ordovic.

Raetliurops
Spinifer macropleurus
Dev.
New Salem, N.Y.

Dalmanella subcarinata
Dev.
New Salem, N.Y.

Dalmanella testudinaria
Ordovic.

4 *Platystrophia lynx*

Ordovic.

Trenton Falls, N.Y.

Trenton Falls, N.Y., (Clinton Co. Ohio)

2 *Rafinesquina alternata*
Ordovic.

Warren Co., Ohio

Strophomena sulcata
Ordovic., Warren Co., Ohio

3 *Platystrophia lynx*

Ordovic.

Madison, Indiana

Orthothetes umbraculum
2 Devonian Germany

1 *Spinifer curvatus*
Devon.
Germany

3 *Bilobites varicus*
Devon.
New Salem, N.Y.

1 *Spinifer canalicatus*
Carbonif.

~~Permian~~ Silurian

2 *Spinifer beekii*
Carbonif.

Dalmanella elegantula
Silur. Sweden

Whitfieldella didyma
Silur. Sweden

Productus horridus
Permian, Germany

Leptaena monobialis
Dev.
New Salem, N.Y.

Dalmanella subcarinata
Ordovic. Warren Co. Ohio

Mollusca

Gastropoda

Platyceras gebhardi

Devon,

New Salem, N.Y.

" Devonian gastropods "

Carbonif. Gastropods

Bulimorpha nitidula

Carboniferous, Penn.

Sphaerodonta primageria

C. Pa.

Euomphalus cattiloides

C. Pa.

Worthenia tabulata

C. Pa.

Naticopsis torta

C. Pa.

Naticopsis nana

Carbon. Penn.
Gettysburg Co.

(1) *gibb*

OLIGOCENE OREGDONTS

- The oreodonts were abundant in North America in the early epochs of the Cenozoic Era.

They can be classed with the hoofed animals, but they are not closely related to any of the modern hoofed forms. In body proportions they were not unlike pigs, but their teeth showed that they were grazing animals, or cud-chewers.

The group appeared in the late Eocene and continued into the early Pliocene, but showed little evolutionary progress during that time, nor did they leave the North American area.

OLIGOCENE CARNIVORES

Dogs and cats appear to have had a common ancestry in the Eocene epoch, ~~xxxxxxx~~ at the beginning of the Cenozoic Era.

By Oligocene time, however, two families were clearly distinguishable. And among the cats the stabbing, or saber-toothed forms were already separated from the typical biting cats.

Dinosaur fossil frag.

" foot bones (18" X 10")

" Vertebrae (3' X 12")

" ? 3 specimens

" teeth (2 small pile)

" jaw frags 18" X 12"

crowdite teeth & scutes 1 pile

phytosaur matrix & 9 teeth (separated)

Turtle (small pile)

(Phytosaur from Trias - San Jon, N. Mex.

3832

W. G. Jones

Others from Calgary Alberta, Canada

Dino. (small pile) Turtle

Took out fish vert & scales
& a "What's it?"

wood of Lepidodendron

seed cone ..

Stem ..

(underground stem or root
also in Sigillaria)

Sigillaria stem
.. leaf

Pecopteris (fern)

Sphenophyllum

Neuropteris (leaves)

Calamites (Equisetum)

near relatives of modern
Scouring rush

Fossil fern

Ammonoites

~~Strophomena~~

Algae?
from Nevada

Corals

Halysites 2 (1 large, 1 small)

Compound (Devon 1)

Favosites (Honeycomb) Sil.

Campophyllum (Dev. Exp)

Trilobites

Cambrian Zaphrentis dalmanensis

Silurian

Calymene (4)

Ordovician

Orthis nov. Drachman gigas

Cambrian

Trilobites - dominant 60% 1-4" long
giant 18" long (10 lbs wt)

Graptolites 30%

Sponges (Archaeocyathoids) found reefs
grew over and between trilobites in a reef
some in Calif, Camb,

calcareous algae (reefs of small size)

Cryptozoa ~~algae~~

Worms

rare

Forams rare

"glass sponges"

jelly fish impressions

fine corals not yet living - scattered

cyrtoids (only echinoderms)

Gastropods few (small shells)

hyolithids (gastropods which swim)

Cephalopods ?

Soft bodied forms

from Burgess shales But CO

Sea weeds

Sponges

Jelly fish

annelid worms

brine - think like from

Ordovician

Primitive armored fishes (ostracoderms) fragments
related to cyclostomes

Graptolites - most distinctive of Ordovician
floating on surface

True corals - honeycomb in reefs 100' across

Brachiopods

Crinoids

Brachyopoda

Trilobites - climax

Clairius

Brachiopods

Thin shelled graptolites

largest ~~many~~ ^{of an animal} ~~separately~~ cephalopods - straight 15 feet long 10" across
+ some loosely coiled

Cryptozoa algae

unimportant { Protozoa

Sponges

Bryozoa

Ostracods (crustaceans)

Silurian

Graptolites declined

Corals expanded

honeycomb, chain, cup, compound tabulars (reefs)

Brachyopoda (reefs) common

Brachiopods

Echinoderm

cyroids

Starfish begin

Echinoids rare

crinoids profuse

mollusks less conspicuous

graptolites, nautilus, clam

Trilobites past climax, but common

Crustaceans (sea scorpions) start of Silurian in some locales

ostracods abundant

? 1st land plants

ostracoderms in streams

scorpions & millipeds

Sponges
~~Archaeocyathus~~Brachiopods

- 1 *Dicelionus politus*
- 2 *Lingulepis primiformis*
- 3 *Paterina bella*
- 4 *Obolus aurora*
- 5 *R. Lingella coloradensis*
- 6 *Eoortus texana*
- 7 *Kutorgina cingulata*

Mollusca

- 1 *Stenotheca rugosa*
- 2 *Maclurella saratogensis*
- 3 *Hypseloconus elongatus*
- 4 *Agolitus princeps* (Pteropod?)
- ~~*Salterella rugosa*~~

5 *Scenella* (small snails)

Cephalopods*Valbonella**Salterella* (structure resembles *Orthoceras*)Tilobites

Dibeloccephalus
Crepicephalus
Bathynurus
Alberella
Agristus
Paradoxides
Olenellus
Bathynotus
Eodius

Ephurderius*Cyrtoids*

Ordovician

Corals

Lamotia (primitive honey comb)
in reefs
Streptelasma (single horn coral)
Columnaria (compound coral, in heads)

Graaptolites
~~Cladopora~~
~~Phyllopora~~
~~Diplopora~~
~~Tetrapora~~
~~Cladopora~~
~~Didymopora~~
Cephalopods

Endermas (stark)
Plectoceras (loosely coiled)
Schroederoceras (")

Echinoderms

Hudsonaster (starfish?)

Echinozaphrentes } cyroids
Malocystites }

Extenuocrinus - Crinoid

Brachiopods (square zone)

Asperosthis
Rhynchotrema
Platystrophia
Strophomena
Rafinesquina
Dalmanella
Zygospira
Lingula

Ostracoda

Lingula

Crustacea (heart-shaped bivalve shell)

Bryozoa (first in Ordovician)

Hallopora
Constellaria
Prasopora

Gastropods

Lophospira
Lecanospira
Ophileta
Maclurella

Homonotoma
Subulites
Bellerophon
Estomaria
Trachonema

Calceopods

Modiolopsis
Byssonychia

Trochites

Cryptolithus
Calymene meekii
Isotelus gigas
Bumastus

Amplex

Ceraurus

Silurian Life

Traptalites (declined)

Monograftus

Corals (expand) reefs

Favosites (honeycomb)

Halysites (chain)

Cup corals (goniophyllum)
4 sided, with the periculum

Compound Tetracorals

Bryozoa - in reefs

Brachiodonts (expand)
(square, flat, globular)
1st spring ones

Monomerella

Chonetes (spiral)

Pentamerus

Rhynchonella

Spizjer

Hyattella

W. Hieldella

Atrypa (very fluted)

✓ Gastropods

Strophostylus

Platyceras

Diaphrostoma

✓ trilobites - passed prime - spring

Stenoccephalus

Rejptor

Mesopodichas

413

Elimoderm

Blastod Troostocrinus

Crinoid Eucalyptocrinus

Crypterids (sea-scorpions)

Crypterus

Pterygotus

Eudocrus

Ostracod large & small

land life

Scorpions

Mithripedia (wales)

Miocene corals (

Devon. Corallitichaura

Good series tubulose
" " corals

Devonian

Corals

Zaphrentis gigantea (large cup coral)
2 ft high
1 1/2" across

(Reefs of compounds 8' across)

Honeycomb corals in reefs

Cyrtophyllum

Lavosites

Heliophyllum

Stromatopora (a hydroid)
(encrusting type)

Brugosia present in reefs

Brachiopods - climax
700 Devonian Brachiopods
N. Amer.

Trilobites (abundant)

Pelecypods

Pterinea (winged)

Nyasia

Goniophora

Leptodonta (winged)

Orthoceras

Grammysia

Graptolites (not so good)

Platyceras (loose)

Bembexia

Loxonema (like Alveola)

* Imp. advent in Dev.

Ephalopods

* Goniatites (repta bent)
(1st ammonites)

Tomoceras (Nautilus)

Bastites

Goniatites (Nautilus)

Apoceras

Echinoderms

Crinoids

Pentameritidea (Blastoid)

Nucleocrinus (Blastoid)

Starfish & Echinoids

Sponges
like Venus flower basket
glass sponges abundant

Trilobites (decline)

Dalmanites (24")

Homalonotus

Carboniferous

Devonian

Reef Corals

Reef (honeycomb)

Cups 2' x 3"

Compound species ^{intensely} 8' across

Bryozoa } ~~limited on the reef~~

Crinoids

Brachiopods - chimney

specimens numerous & varied

Belemnites more common

Forcipods not diversified or common

Cephalopods

Goniatites (septa bent at angle)

Goniatites are the 1st of the ammonites

Trilobites on decline

Echinoidea

Blattaria ascending

Starfish

Echinoids

Crinoids numerous & varied

Sponges (like Venus flower basket) locally abundant

~~Ammonites abundant~~

~~Hebert~~

Anthracites 20' long (heavy armor)

Ostracoderm (pencil water)

Lingulids (gamboids ^{abund.} & Crinoid stems)

No Teleosts

Amphib. footprints ^{grayland} Stegocceph skulls (1932)

Sand plants - ~~highly~~ ^{hydr} mites

Scale trees (pinnate evergreen with blade-like leaves)

foreman of Carbonif. Seed ferns

Mississippian

Decline of trilobites & corals

Expansion of echinoderms, large Bryozoa, graptolites, Brachiopods

Crinoids numerous variations

Blastoids common

Graptolites rare

Sea urchins a few abund locally

Lorains first time imp. as rock marker

Corals persist but not varied or common

Tabacoral (Lithothamnion) just abund

Honeycomb about

Bryozoa numerous (Carabellinae)

Brachiopods still dom. shell fish (spring ones part'ly)

Molluscs

small clams & snails

gastropods advanced

Trilobites almost extinct

No insects yet

Fishes abund. (esp. Cestraciont sharks)

shell-crushing teeth (pavement teeth) contributed

to decline of trilobites?

Small salamanders known from Europe

& footprints here

Tertiary

2 cases
1 animal
1 plants

Trilobites - St. Ordo Rev,
Brachiopods - " " " Permian
Corals " " " "
Crinoids " " " Carbonif.
X Goniatites?
X Plants Carbonif. only
? Shark teeth " "

Mesozoic

Plant
Vert
Invert
3?

Shore some Molluscs (mod. ~~thin~~ Cret.)

Ammonoites - Luras - Cret

X Bony fish (Wyoming nat.?)

? X Plants (cycads, conifers, palm?)

Reptile

Cenozoic

2 - Eocene - Oligo? (Oligo. Sreodon)

4 cases - Miocene -

Plants - 1 case Barton mammals

Fish

1 - Birds

1 - Shells

Desmodylus

Plio - Plioto

2 - Plioto vertebrates from marine deposit
Pluto invertebrate " " "

Pennsylvanian

Forest of the swamps

Spore bearing trees (giant of the day)
related to mod. ground pines & spongy
mushes. (Equisetum)

Seed bearers common but spore-bearers more
abundant

Ferns common. (large, with fronds 5-6' &
trunks 50' high)

Seed ferns (perhaps ancestors of later seed plants)
more common than true ferns

Spongy rushes with stems verticillately
ribbed & regularly jointed at each ~~joint~~
a whorl of slender, simple leaves
Largest was Calamites 12" diam, ht 30'

Trunks thin, woody cylinders with pithy core,
surrounded by thick bark. Woody layer
only about 2" thick

Scale trees most important. Close set leaves
left permanent scars as they fell off -
on trunks & limbs gives appearance of scales.

4-6' diam. Tapering trunks to 100' ht.
Lepidodendron & Sigillaria (100 species)

Roots strange - main root horiz. with no tap root. Rootlets
growing from sides of main root, (root stalks called Stigmaria)

Cordaites - forebears of mod. conifers -
soft wood trunk, parallel veined leaves
But leaves blade-like 5-6"

seeds not in cones but in racemes

Attained ht 120' diam 3' $\frac{2}{3}$ trunk without
branches

top a dense crown of branches & leaves

Pennsylvanian animals

land. —

Insects — large 4-6"-8" (3 over a foot) diagonally 29"

Centipedes

Spiders

Scorpions

Land snails

Amphibians (nearly all with long arms or heads) — Stegoceph.

Reptiles (few & small)

Fresh water clams

Marine

Brachiopods } proper

Bryozoa

Pelecypods } more common

Gastropods } "

Cephalopods not "

Nautiloids declining

Somatites more complicated structures

Corals — a few, mostly solitary

Echinoderms —

Crinoids — fairly abundant

Sea urchins

Blastoids — the last

Fusilined forams. large bottom-dwelling + corals

Also small forams

Gastropods continue

Permian

Plants

Native *Sphenodendrons*, *Sigillarias*, *Calamites* & *Cordaites*
went into Permian but as the temperature cooled they
disappeared, giving way to

Cordaites - to - true conifers
Cycadeoids foreshadowed higher Mesozoic plants

Glossopteris - thick-leaved "tongue-ferns"
Tongue-shaped fronds come on creeping root stalks
Bare seeds (related to cycads)

Never reached western Europe - or N. Amer.
with *Glossopteris* were ferns, conifers, *Calamites* but
not scale trees.

Scale trees came back after glacial part of Permian.

Insects - abundant & varied but smaller
Stegopter continue - broad heads, thick bodies short legs,
red beds of Texas & Okla.

Reptiles increased - long bodies, long tails, short legs.
some agile & lizard-like, others sluggish & semi-aquatic
8-10' max size - all 4 legged.

Short-bodied Theriodont reptiles foreshadow mammals
Karoo so. of. Teeth differentiated into D, C, M.
bodies carried off pouch.

Marine

Cephalopods skinned deer

Goniatites more complex sutures gave rise to ammonites

Pelecypods & *Gastropods* prospered conservatively

Brachiopods ^{common} bulk of fauna (productids dom.)
most all die out before end of Permian

Fusulinids cont. as rock makers but at end of per. died out
& trilobites, honeycomb coals & Ichneumonids died out & with
Trilobites, all of blastoids, corals & Bryozoa

Palaeozoic Brachiopods cont'd.

- Bitobites varicus* — N.Y. — Dev.
Schizophoria striatula — Genesee Dev — not good
Atrypa reticularis — N.Y. Dev
Eatonia medialis — N.Y. Dev,
Deltothyris perlamellosa — N.Y. Dev.
Atrypa imbricata — N.Y. Dev,
Meristella arcata — N.Y. Dev,
Uncinulus nucleolatus — N.Y. Dev — not good
~~*Spirifer macropleurus*~~ — N.Y. Dev —
Spirifer curvatus — Genesee Dev, — omit
~~*Brachyopoda*~~ *Stenogyrocephalus Guxtoni* " Dev,
Anastrophia verneulli — N.Y. Dev,
Leptaena rhomboidalis — N.Y. Dev
Trematospira multistriata — N.Y. Dev,
Pugnax grovenori (Miss. U. Carb.) Ind.
Productus horridus — Pennsylv. Genesee

(over)

Cephalopods — Mesozoic

Jurassic

Paltopleuroceras spinatum — Eng.

Parkinsonia bifurcata — Germany

Quensiedtocras lamberti — Eng.

Perisphinctes ^{marcellii} ~~convolutus~~ — France — best

no good — *Lioceras spalinum* — France

Amalthenus margaritatus — Wurttemberg

Ochetoceras flexuosum — France — no good.

Dev. X ²⁴ (*Platyceras gebhardi* — Dev. N.Y.)

Orthoconch? *Heteroceras hestium* — Germany

Orthoconch? *Canerocras protiforme* — Ord. N.Y.

Ludwigia murchisoniae — Germany — not good

Haploceras staszyci — France — not good

Ophidoceras varicosatum — Wurttemberg — not good

~~Phylloceras~~ *Phylloceras heterophyllum* — France

Coroniceras kudion — Germany

Cretaceous — S. Dak.

Prionotropis woolgari — " "

Prionocyclus wyomingensis — " " (in comp. coils)

Scafrutes warreni — " " (in plaques 4)

" *nodosus* (2) — " "

yes Nautiloid? *Eutraphoceras dekayi* — France

Douvillieroceras mamillare — "

Hoplitis delucii

• Large *Basulites* & large *Pacenticeras* (ammonites)

coral?
Protospongia
returta
olus
Ord. Paleozoic

Usable specimens on exhibit

Ord. Paleozoic

Streptelasma rusticum - Ordovic, Ohio

Favosites emmonsii - Dev, Canada

omit { " digitatus - " Iowa
" limitaris - " "

omit? " wickelli - " Indiana

Goniophyllum pyramidalis - Sil. - Sweden (quad-
rangles)

Calceola sandalina - Dev. Genesee

Diptyphyllum sp. - Sil - Kentucky

Echinoderm

Blattaria - Pentamerites sulcatus - Ind. (Mississ. - U. Cantons)

Age (5000) Crinoid - Glyptocrinus decastylus Ord. Sil. (heads)
in shale

Isotelus gigas - Ord. - N. Y. (2 curled)

Calymene niagarensis - Sil. Illinois

Oil cores of all
ages - suggest
put at back before
fossil history.

Mesozoic

3 "Ammonites" Denton Co., Texas

Evolute coil & lumpy (1 large 8-10")

Paleozoic Brachiopod

Sil - Whitfieldella didyma - Sweden

" - Dalmanella elegantula - "

Ord. - Dinorthis subaequata - Ohio

" - Herpetella occidentalis - Indiana

" - Rhipidodonta dentatum - Indiana

" - Platystrophia lynx - (2) " & Ohio

" - Plectambonites sericeus - Ohio

" - Zygozonia modesta - (2) " N. Y. & Ohio

" - Dalmanella testudinaria - Ohio

Dev - Strophomena rugosa - N. Y.

" - Dalmanella subcarinata - N. Y.

merged " - Gypidula galeata - N. Y.

" - Lingula spathulata - Canada

Clear int

L 113 - Josephine Chapman

10 chain corals - Iowa

17 honey comb corals - "

3 pipe corals

6 cup corals quadrangular

~~4~~ " " (single round)

6 heads of coral

2 fragments "coral rag"

and other shells

6 cirrroids

L 234 - Mr. G. J. Johnson

6 cup corals

3 polished "

L 194 - Mr. L. W. Porter

9 Bad levels of S. Date, shells

12 frags. Baculite

9 ammonites S. Date Bad levels

MESOZOIC MARINE INVERTEBRATES

The dominant invertebrates of the Mesozoic seas were the Ammonites whose chambered shells bore beautifully intricate patterns formed by the suture lines between chambers. Related to the Ammonites were the squid and octopus, whose early ancestors also appeared at this time.

The Trilobites, characteristic of the Paleozoic seas, had disappeared completely. The crinoids and brachiopods were on the decline and were much less abundant in the Mesozoic than they had been in the preceding era.

Modern types of sponges, reef corals, starfish, sea urchins, clams, snails, crabs and lobsters were becoming increasingly abundant.

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Modern types of sponges, reef corals, starfish, sea urchins, clams, snails, crabs and lobsters were becoming increasingly abundant. On the other hand the crinoid & brachiopods, which had flourished in the preceding era, were on the decline, and the Trilobites had disappeared completely, before the beginning of Mesozoic time.

MESOZOIC VERTEBRATES

Reptiles so dominated the earth in Mesozoic time that the era became known as the Age of Reptiles. On land were the several tribes of dinosaurs, ranging in length from 80 feet down to small forms of only 2½ feet. Ichthyosaurs, plesiosaurs and the like swarmed the seas. And in the air

They branched out into hundreds of kinds, filling into all the environmental niches today occupied by the mammals and birds.-- the dinosaurs on the land, the ichthyosaurs, plesiosaurs and the like in the sea, and the ~~xxxx~~ bat-winged pterosaurs in the air.

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The fishes continued their evolution throughout the Mesozoic ~~era~~, and the first of the Teleosts, which are the dominant bony fish of today, occurred late in the Era.

The warmblooded vertebrates, the birds and mammals were beginning their development at this time, also, but were still insignificant. The first mammals appearing late in the first period of the Era (Triassic) were tiny things and of very rare occurrence. By the end of the Era, primitive forms similar to the opossum and the shrew were recognizable.

The first birds appeared in the middle of the Era (Jurassic) These were primitive, reptile-like creatures with toothed jaws, but feathered bodies and wings. By the end of the Era, true birds had developed and forerunners of some of the modern orders were recognizable.

Euleptorhynchus sp.

~~Living members of this genus~~

A member of the Halibut family of long, slender fishes having the protruding lower jaw. Members of this genus have resemble flying fishes in their leaping behavior.

Sulphur Mt.

Haliotis rufescens Swam
Haliotis fulgens Phil.
Haliotis corrugata Gray
Haliotis cracherodii Leach

Dental Plates of Polynoid Worm

Macrocallista aurantiaca Hanley
New record

Glyptostoma cf. *newberryana*
W. G. Binney

Phyllonotus radix Gm

Phyllonotus nigritus Phil

Protothaca restorationensis
Függel

believed to be a northern
sp.; is not rare in Newport
Bay deposits

Rodents 4" 6

Protothaca picta Dall
placed in *Chione* by Willett

Paratype

Cardita hilli Willett
Paratype

~~*Turbonilla gouldi* Willett~~
~~Type~~

Unidentified

Miscellaneous Material

Upper Pleistocene fossils ~~typical~~ material
known as "anomia Bed".

Found in a deposit ^{mainly in} 4510 feet in
Thickness at a depth of 20' below st.
level in the out fall sewer excav.
at Lomita Blvd. & Main Street
Wilmington.

The marine invertebrates of the Upper Pleistocene of
southern California ~~xxxxxxxxxxxx~~ indicate the presence
of much warmer water off our coast in the past, than today.
discoveries
One of the Los Angeles Museum's most recent ~~xxxxxxxxxxxx~~
of marine life of the Upper Pleistocene (Palos Verdes time)
was a deposit on Lomita Blvd. at Main Street, in Wilmington
California. The invertebrates found indicate a shallow
water, estuarine environment (mud flats) existing in a very
warm climate.

The deposit is outstanding for the beautiful preservation of the material

UPPER PLEISTOCENE MARINE LIFE

wa
Deadman Island
In southern California the Deadman Island exposure is outstanding as it shows the strata of three epochs of the Cenozoic Era; the highly tilted Miocene shales, ~~lying on~~ overlain by slightly less tilted beds of Pliocene age, which in turn are topped by deposits of Pleistocene age, distinguished into a ~~low~~ lower, cold water zone (Lower San Pedro) and upper warm water zone (Upper San Pedro, or Palos Verdes). *San Pedro*

Other ~~exposures~~ exposures on the San Pedro Water front ~~show the Pliocene and Pleistocene deposits, but only at Rimm's Point is the Miocene present.~~
show the Pliocene and Pleistocene deposits, but only at Rimm's Point is the Miocene present. *a well.*

These localities of the San Pedro area are ~~the~~ type localities of ~~the~~ marine deposits of the ages represented.

and were first discussed in detail by Ralph Arnold in 1903.

Unfortunately the exposure has now been destroyed in order to erect government fuel dumps.

Marine Pliocene & Pleistocene

Deposits of the San Pedro Area

The Mt. Eden formation ~~xxxx~~ of mid-Pliocene age is exposed ~~for a distance of~~ ~~for a distance of~~ near Beaumont. The lower strata of the formation are red in color and are unfossiliferous. The upper beds, some 1500 feet in thickness are ~~of a gray shale and sandstone~~ are gray shales and sandstones bearing both plant and vertebrate fossils.

Cones, scales and seeds are found petrified, some of them within concretions. Leaf impressions also occur in the finer ~~matrix~~ parts of the matrix. The plants represented are of three distinct associations: a desert-border unit, a coniferous group; and chaparral.

Judging from a study of the geology of the region as well as the entombed remains, the area was evidently occupied by shallow lakes and marshes with adjacent highlands. The plants show several distinct associations; desert-border, coniferous, chaparral and riparian, and were evidently derived from different levels of a mountain slope adjacent to the depositional basin.

PLIOCENE PLANTS OF SOUTHERN CALIFORNIA

The Mount Eden formation of mid-Pliocene age is exposed near Beaumont. The upper beds of the formation, some 1500 feet in thickness, are gray shales and sandstones which bear both plant and vertebrate remains.

Cones, scales and seeds are found petrified, some of them within concretions. Leaf impressions also occur in the finer parts of the matrix.

Judging from a study of the geology of the region as well as the fossils, the area was evidently arid, though occupied by scattered shallow lakes and marshes with adjacent highlands. The plants show several distinct associations: desert-border, coniferous, chaparral and riparian.

9 Avocado Persea misamericana

Avocado

Sycamore

Oak

MIOCENE PLANTS OF THE PACIFIC COAST

The Miocene shales of the Pacific Coast have ~~preserved~~^{yielded many} quantities of plant remains. From these it is possible to determine ~~the~~ not only the general floral associations of the area, but ~~the~~ something of the climatic conditions.

The Flora of ~~the~~ central and southern California ^{was} of a subtropical type, that of extreme northern California ~~was~~ up into Oregon ~~was~~ showed a cooler climate

LEAVES OF PLANTS FROM SOUTHERN CALIFORNIA

(specimens to left)

The Puente Upper Miocene Marine diatomite was laid down in relatively shallow water. Occasional leaves were found in the deposit, evidently those which had blown into the water from nearby shores.

Most of the plants are of extinct species but ~~Nearly all of the plants~~ show relationship to those which may be found today on the northwest coast of Mexico, a region where there are now ample summer showers and mild winters free from frost.

Other shale deposits in ~~the~~ southern California also contain ~~some of the~~ the same general type of flora indicating subtropical conditions during the Miocene time.

plant fossils
most of them in the
form of impressions

OLIGOCENE MAMMALS

The beginning of the second epoch of the Cenozoic Era found the mammal fauna very well modernized. ~~The~~

The mammal fauna of the second epoch of the Cenozoic Era was recognizably of modern type.

mammals
By the second epoch of the Cenozoic Era (the Oligocene) ~~the~~ many families ~~which~~ represented today were already in existence. ~~xxxxxxx~~ Recognizable ancestors of the rhinoceroses, horses, camels, beavers, squirrels, mice, rabbits, peccaries and tapirs

rhinoceroses, horses, tapirs, camels, peccaries, dogs, cats and many small rodent groups were present in western America. ~~And~~ in the Old World the elephant ~~group~~ group ~~xxxxxxx~~ ~~xxxxxxx~~ first appeared. In addition to these ancestral types of our present-day mammals there were other groups which flourished for a few million years and then died out. Among these were the oreodonts, the hyracodonts, and the titanotheres.

*and the oldest known ancestor of the giraffe - like of the present day
the for the great*

MIOCENE MAMMALS

to more arid conditions

Climatic changes in the middle of the Cenozoic Era resulted in the diminishing of forested areas and the spread of prairies. Coupled with ~~this process~~ these changes in flora the hoofed mammals of the Miocene show marked evolution toward grazing habits. This ~~period~~ epoch, for example, marks the first appearance of ~~the~~ long-crowned teeth in the horses.

The Oreodonts continued to be common and the rhinoceroses were still present in America.

There was a general trend toward

~~xxxxxxx~~ Miocene mammals ~~showed~~ increase in size over the ~~earlier Cenozoic~~ Oligocene forms.

*In general the Miocene mammals
showed an increase in size over the
Oligocene forms.*

PLANTS OF THE PALEOZOIC ERA

THALLOPHYTES -- bacteria, fungi, algae
 Algae -- Archeozoic (first) Also in Paleozoic

BRYOPHYTES -- mosses, liverworts, etc.

PTERIDOPHYTES -- ferns, horsetails, club mosses (or ground pines)

(3) Equisetales (horsetail rushes, Calamites) and Sphenophyllum
 Calamites -- late Paleozoic rushes 60-70 feet high.

branched in the Paleozoic, not today.

Sphenophyllum -- Paleozoic; more vine-like than Calamites
 (extinct before end of Paleozoic)

(2) Lycopodales (club mosses, or ground pines, Lepidodendron,
 Sigillaria) Also called "scale trees")

Have strap-like, parallel-veined leaves

Lepidodendron -- late Paleozoic; leaf scars in spiral rows.
 crown of stubby branches, made by even forking.

Sigillaria -- late Paleozoic; leaf scars in vertical rows.
 Seldom branched; trunk vertically ribbed.

(1) Psilophytales -- primitive, rootless forms; stem smooth or
 covered with spines. Small, bog plants.

First in ~~low~~ upper Silurian?; best known in
 lower and mid-Devonian (Rhynia and Asterophyton)
 and Psilophyton) Leaves absent or short & linear.

(4) Filicales -- Ferns

pteridophytes -- Among the oldest known fossil land plants
 (Lower Devonian)

SPERMATOPHYTES GYMNOSPERMS -- Plants with naked seeds.

Cycadofilicales -- Seed ferns, Glossopteris. Fern-like leaves,
 but seed-bearing. Extinct early Mesozoic

Cordaitales -- Late Paleozoic; between seed ferns and true
 (Cycadeoids) conifers. ~~xxxxxxx~~ Strap-shaped leaves with
 parallel venation. Seeds ~~xxxxxxx~~ arranged loosely in racemes,
 rather than in cones. Trees more than 100 feet
 high. Became extinct early in Mesozoic.

Cordaites. (Devonian and Carboniferous)

Coniferales -- Appeared in Permian and were rare.
 (Walchia, thought to be ancestral to modern pines;
 Voltzia, possibly ancestral to Sequoia)

Cycadales -- Sago palms. Bear seeds in loose cones

Ginkgoales -- Maiden-hair tree.

Cambrian -- Marine algae

Silurian (Up). -- Psilophytales (rootless sporebearers)

Low Devonian etc. -- Filicales, Equisetales, Lycopodales, Psilophytales
 Cordaitales Lepidodendron, Sigillaria

Carboniferous -- same as Devonian. particularly Calamites,

Permian -- Coniferales added.

MESOZOIC PLANTS

Vegetation in the Mesozoic was of two distinct types, the earlier (through the Triassic and Jurassic Periods) predominating in conifers, cycads, ginkgos and ferns; the later (in the Cretaceous Period) introduced ~~the earliest~~ the Angiosperms -- the highest type of seed plants, which form the predominant vegetation of the modern world.

The last of the giant spore-bearing trees disappeared as the continental uplift at the end of the Paleozoic Era drained the land of its great swamps. The conifers, cycads (sago palms) and ginkgos (maidenhair tree) which followed were scrubby forms, accustoming themselves to drier land, and developing their root systems. The flora was widespread, and the cycads and ginkgos which today are ~~limited~~ distinctly limited in their distribution were common and cosmopolitan. Among the conifers, ancestral types of pine, sequoia, cypress and cedar were abundant.

The cycads bore flowers of a sort, and were possibly ancestral to the later Angiosperms which are the true flowering plants. The Angiosperms appeared first in Greenland, and later in North America and Eurasia. These oldest ^{forms} were remarkably like the plants of today. Palms and hardwoods both occurred and some of the Cretaceous forests contained recognizable willows, magnolias, sycamores and cottonwoods.

(monkey puzzle pines)

Among the conifers the Araucarias predominated throughout the world, though today they are known only in the southern hemisphere. The largest trees of the Arizona petrified forest are Araucarias. Other conifers included ancestral types of pine, sequoia, cypress, ~~and~~ cedar and fir.

2.

The Newport occurrence

this is the only known fossil deposit in the world in which every Phylum of the Animal Kingdom is represented.

Plants

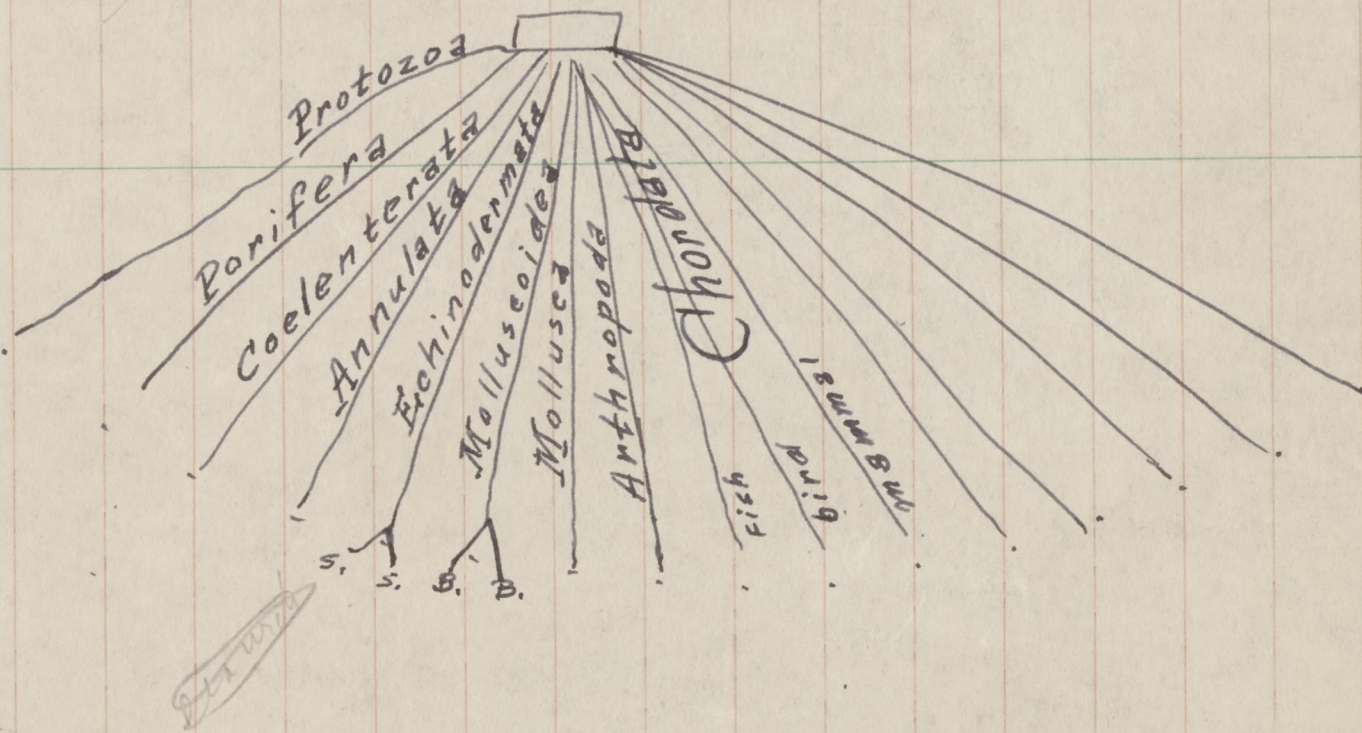
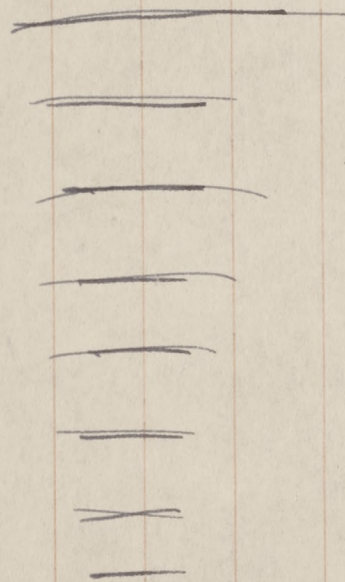


EXHIBIT LABEL

The cases on the west side of the mezzanine show fossil remains of animals and plants which lived on the earth before the beginning of the written history of man.

Starting at the back of the gallery with the oldest fossils, the exhibit continues up to the Epoch which presumably ended about 25,000 years ago, and which immediately precedes the Recent, geologically speaking.

Particular stress is placed upon the Cenozoic Era, because it is deposits of that age which are best represented in California. In treating the Pleistocene, the marine fossils of southern California are stressed, as the life of the land at that time is well illustrated in the exhibit of Rancho La Brea fossils in the gallery below.



THE GEOLOGIC TIME SCALE
(Time in years is an approximate estimate)

ERAS	PERIODS	EPOCHS	DOMINANT LIFE
CENOZOIC	Quaternary	Recent (Began 25,000 years ago)	MAN
		Pleistocene (Began 1,000,000 years ago)	
	Tertiary	Pliocene ¹⁰ (Began 20,000,000 years ago)	MAMMALS
		Miocene (Began 30 million years ago)	
		Oligocene (40,000,000 yrs. ago)	
		Eocene (60,000,000 yrs. ago)	
		Cretaceous (Began 120, million yrs. ago)	
	MESOZOIC	Jurassic (Began 150 million yrs. ago)	REPTILES (Dinosaurs)
		Triassic (Began 180 million yrs. ago)	
		Permian (Began 225 million yrs. ago)	
PALEOZOIC	Mississippian (or Upper Carboniferous) (Began 270 million yrs. ago)	SIMPLE FORMS OF LAND LIFE (in later periods)	
	Pennsylvanian (or Lower Carboniferous) (Began 300 million yrs. ago)		
	Devonian (Began 345 million yrs. ago)		
	Silurian (Began 375 million yrs. ago)		
	Ordovician (Began 435 million yrs. ago)	MARINE LIFE (in early periods)	
	Cambrian (Began 540 million yrs. ago)		
PROTEROZOIC	(Began 1 billion yrs. ago)		
	SIMPLE MARINE LIFE		
ARCHEOZOIC	(Began 1½ billion yrs. ago) (no actual fossils known, but indications that life existed)		

Placenticeras californicum Anderson

A series of shells of individuals of different ages to demonstrate ~~growth~~ stages in growth of the shell of an ammonite.

Cretaceous Bel-Air, Calif.

Acanthoscaphites nodosus

Showing growth stages and variations which occur among individuals of a species.

Cretaceous

EOCENE MARINE INVERTEBRATES

In early Cenozoic time the sea extended inland from the present Pacific coastline as far as the Sierra Nevada Mountains. Several small ranges in southern California are made up largely of marine Eocene deposits.

The invertebrate fossils of the Eocene belonged, for the most part, to genera represented by living forms. A few specimens from the Eocene of San Diego County are shown here.

C. S. S.

MESOZOIC CEPHALOPODS

The Cephalopods were the most abundant of the marine invertebrates of the Mesozoic Era.

They represent that class of the Mollusca which includes the octopus, squid and Nautilus of today; and the Ammonites of the past. A characteristic of all Cephalopods (with the exception of the octopus group) is the presence of a chambered shell. Though in the coiled shells, the Ammonites and Nautiloids superficially resemble snails, the chambered character of the shell distinguishes them from any other type of shell fish.

Ancestral types of the living forms occurred in the Mesozoic. But most numerous of all were the Ammonites, which numbered hundreds of different species, and were world wide in distribution.

NEUROPTERIS

An abundant seed fern of the later Paleozoic. The pinnules are fairly large, oval or tongue-shaped, with heart-shaped bases, and attach to the rachis by a single point at the base of the mid-rib.

LINOPTERIS

Linopteris is classed with the neuropterid ferns but differs from the typical Neuropteris in that the pinnules lack the definite mid rib, and the veins form a net work over the surface.

PECOPTERIS

An abundant true fern numbering a great many species and related genera. Possibly some of the apparent relatives are actually seed ferns.

In the pectopterids the entire base of the pinnule is attached to the rachis.

ASTEROTHECA

A common pectopterid fern which is best distinguished by its spore cases. The leaves are very variable, the pinnules often differing along a single frond.

ALETHOPTERIS

A pecopterid-like leaf but ~~exactly~~ a seed-bearing, rather than a spore-bearing plant/

The pinnules are usually longer in Alethopteris and the bases of adjoining pinnules coalesce into one another at their points of attachment along the rachis.

ODONTOPTERIS

This seed-fern ~~had~~ resembled Neuropteris somewhat, but the entire base of the pinnule was attached to the rachis. Instead of a single mid rib, several veins entered the pinnule from the rachis.

EXTINCT SEA MAMMAL

Desmostylus hesperus

An extinct sirenian, known only from fossils found on the Pacific Coast and in Japan. Its nearest relatives ~~are~~ the Manatee ~~xxxx~~

Specimens from the Vaqueros or Temblor Miocene of Ciervo Hills, Fresno County, California.

FERNS
(Filicales)

Many true, spore-bearing ferns/similar to modern ferns were present in the Paleozoic. Strangely enough, however, their leaves cannot be distinguished from the seed-bearing ferns (Cycadofilicales). Only when the spore cases or the seeds are found with the leaves is it possible to determine to which groups they belong.

The Ferns first appeared in the Devonian period (middle Paleozoic) at the beginning of the history of land plants and land animals.

CALABASAS CORMORANT

(Phalacrocorax femoralis)

The hind quarters of this cormorant were found preserved in a slab of rock in a quarry near Calabasas. Note the slight discoloration around the skeleton indicating the impress of the body feathers and the webbing of the feet.

This cormorant differed from ~~many~~ living cormorants of relative this coast in the proportions of its leg bones. ~~these are the~~
CAST OF TYPE

STOCKTON'S BOOBY

(Sula stocktoni)

The imprint of the wing bones and part of the body skeleton are all that is known of this extinct booby which once lived along the southern California coast. The specimen was taken from a diatomite quarry at Lomita.

A number of other extinct members of the booby family have been recorded from California's Miocene, but today the family is almost never encountered in western waters north of the Gulf of California.

CAST OF TYPE ~~original~~

DIATOMITE SHEARWATER (Puffinus diatomicus)

This shearwater is the most abundantly represented of all the ~~extinct~~ ^{shale} Miocene sea birds of California.

This specimen was taken from the diatomaceous ^{shale} beds at Lompoc where ~~numerous other birds~~ several other birds, numerous species of fish and a few mammals were found. The ~~diatomaceous~~ diatomite at this locality is of extreme purity and snowy whiteness, and is removed ~~in split into~~ blocks and slabs for commercial use. In the course of quarrying this material, the shale ~~is often~~ frequently cleaves, or splits in such a way as to expose these fossil remains.

MARINE BIRDS OF THE MIOCENE
OF CALIFORNIA

In ~~these~~ four localities in California
The marine Miocene shales of ~~central California~~ have yielded
~~excellent~~ unusually complete bird fossils. These represent
six families of sea birds, the ~~sea~~ shearwaters, albatrosses,
boobies, cormorants, godwits and auks.

The specimens shown here ~~are~~ are from three of the four
localities

though
In each family the species included ~~are~~ no longer living today
are not widely different from modern relatives.

In each an imprint of a large part of
the skeleton is preserved even where the
bone itself ~~is~~ is no longer present.

small

AMMONOIDEA

Copied
Certain of the Ammonites resembled the living ^{but} Nautilus, having a coiled, chambered shell. The suture lines between the chambers, ~~however~~, were of more complicated pattern, ~~in the Ammonites~~.

Arising from the more simple-sutured goniatites of the Paleozoic Era, the Ammonites increased in complexity of suture and variety of coiling ^{in the Mesozoic Era}.

Just as the goniatites apparently arose from simple, straight-shelled forms of the earlier Paleozoic, certain of the Ammonites tended to return to the uncoiled form in the Mesozoic. In Baculites, for example, only the initial chambers were coiled, the remainder of the large shell was straight. Sections of this straight shell might be mistaken for the Orthoceras-type shell of the Paleozoic except for the complication of the suture pattern in the later form.

Related to the

Copied
BELEMNOIDEA

Related to the living squid, the ancient Belemnites had a relatively small shell which was completely overgrown by the fleshy mantle of the body. The shell served more as a supporting internal skeleton than a protective armor.

^{as the ammonites}
The Belemnite shell ^{was} is chambered, as is the Ammonite, but the apex of this chambered part was encased in a solid protective sheath. It is usually only the sheath which ^{is} preserved as a fossil.

care label

THE BEGINNING OF THE CENOZOIC ERA

With the opening of the Cenozoic Era, life on the earth began to assume a modern aspect. The first epoch of this latest Era has appropriately been named the Eocene mean dawn (EOO) of the recent (cene).

The reptile dominance was at an end. On land, the dinosaurs were gone, and only types similar to modern reptiles persisted. The mammals ~~now came~~ and birds now came into their own and ancestral types of most of the modern orders appeared.

In the sea the mosasaurs and other great swimming reptiles ~~had~~ disappeared, and the first of the marine mammals ovvurred. Among the fishes, the Teleosts, or tru bony fish, were the dominant type. Modern types of invertebrates were becoming abundant, and ~~all traces of the great tribe of~~ Ammonites was extinct. Kiving genera of mollusks, echinoderms and corals were already represented.

Care label

MESOZOIC VERTEBRATES

Reptiles so dominated the world in Mesozoic time that the ~~era~~ became known as the Age of Reptiles. They branched out into hundreds of kinds, fitting into all the environmental niches today occupied by the mammals and birds -- the dinosaurs on the land, the ichthyosaurs, plesiosaurs and the like in the seas, and the bat-winged pterosaurs in the air. And at the same time, the lesser types which have continued on to the present day, were undergoing development.

The fishes continued their evolution throughout the Mesozoic, and the first of the Teleosts, which are the dominant bony fish of today, occurred late in the Era.

~~The warm-blooded vertebrates, the birds and mammals were beginning their development at this time also, but were still insignificant.~~ The first birds appeared in the middle of the Era (Jurassic period). These were primitive, reptile-like creatures with toothed jaws, but feathered bodies and wings. By the end of the Era, true birds had developed and forerunners of some of the modern orders were recognizable.

The first mammals appearing near the beginning of the Mesozoic (Triassic period) were tiny things and of very rare occurrence. By the end of the era, ~~xxxxxx~~ primitive forms similar to the opossum and the shrew were recognizable.

over

MESOZOIC MARINE INVERTEBRATES

The dominant invertebrates of the Mesozoic seas were the Ammonites, whose chambered shells bore beautifully intricate patterns formed by the suture lines between chambers. Related to the Ammonites are the squids and octopus whose early ancestors also appeared at this time.

Modern types of sponges, reef corals, starfish, sea urchins, clams, snails, crabs and lobsters were becoming increasingly abundant. On the other hand the crinoids and brachiopods, which had flourished in the preceding Era, were on the decline. And the Trilobites had disappeared completely before the beginning of Mesozoic time.

Over

small

SCALE TREES
~~Lycopods~~
Lycopodiales

~~Plant~~

Sporebearing plants related to the club mosses of today formed some of the largest trees in the forests of the Upper Carboniferous, 270 million years ago. The two characteristic lycopods of this period were the Sigillarias and the Lepidodendrons, often referred to as "scale trees." In both forms the strap-like, parallel veined leaves were thickly distributed over the stem, or trunk, and as the older ones were shed, left prominent scars resembling scales. In the Sigillarias the scars were in vertical rows, in the Lepidodendrons the arrangement was diagonal.

The straight trunks grew to heights of 40 to 100 feet, the Sigillarias unbranched, the Lepidodendrons usually having a crown of short branches.

A system of lateral-spreading underground stems (stigmaria) supported the trees and also served for the production of new trunks. The spores were borne in large, cone-like structures, known as strobili, attached near the tips of the stems.

SCOURING RUSHES
Equisetales
~~Equisetales~~

The Calamites, or scouring rushes of the Carboniferous grew to great size, with stems 12 inches in diameter and attaining heights up to 70 feet.

As in the modern horsetail rushes, the stem had only a thin layer of wood surrounding the central pith. The leaves were arranged in whorls (annularia) and were longer and more graceful than in those of today.

Spores were borne in strobili at the tips of the stems, as in the lycopods.

A related form which has no modern descendants was Sphenophyllum which was more vine-like in its manner of growth.

FERNS
Filicales

BRYOZOA

all small

The Bryozoa are often called "moss animals" as their colonies form mat-like incrustations on rocks or on the shells of other animals.

The group is still in existence today, but was first known from the marine deposits of the Paleozoic era.

BLASTOIDS

Extinct relatives of the starfish, sea urchins and sea-lilies, which existed only in the Paleozoic era.

The blastoids were somewhat similar to the crinoids in structure, except that there were no "arms." A "stem" was often present, though rarely preserved.

TRILOBITES

The trilobites were primitive arthropods (Joint-footed Animals) in which the body was divided longitudinally into three lobes, hence the name trilobite.

The hard outer covering of the body was segmented through the thorax, allowing the animal to roll itself up for protection, after the manner of the sow bugs.

These marine creatures were characteristic of the Paleozoic, flourishing particularly through the middle of the era (Devonian), diminishing in the Carboniferous period, and disappearing completely by the end of the Permian.

BRACHIOPODS

The brachiopods, or "lamp-shells", were the abundant type of "shell-fish" of the Paleozoic. Snails and clam-like forms appeared before the end of the era, but were not numerous until later geologic time. The brachiopods, on the other hand, have decreased in numbers and are represented today by comparatively few forms.

Like clams, brachiopods have a bi-valve shell, but the body of the animal inside the shell is situated so that one valve is below, the other above. In clams the two valves are right and left, not upper and lower.

CORALS

Corals are first known from the earliest Paleozoic period, the Cambrian. These first forms had no skeleton, and the soft body resembled that of the Sea Anemone. Imprints of these primitive corals have been found as fossils.

By the Silurian period, and throughout the remainder of the Paleozoic

CORALS

Corals are first known from the earliest Paleozoic period, the Cambrian. These first forms had no skeleton, and the soft body resembled that of the Sea Anemone. Imprints of these primitive corals have been found as fossils.

By the Silurian period, and throughout the remainder of the Paleozoic era, corals with exoskeletons were abundant. Structures analogous, though not identical, with modern coral reefs appeared.

The characteristic corals of the Paleozoic were the many cup corals, some of which were solitary, others growing in colonies; the honey com corals (Favosites); and the chain corals (Halysites)

CRINOIDS

The crinoids, or "sea lilies", first appeared in the early Paleozoic (Ordovician) and were very abundant throughout that era. The group has continued on up to the present day, though in reduced numbers.

Although flower-like in appearance, crinoids are marine animals, not plants. The body is cup-shaped and covered with calcareous plates to which attach the radially arranged "arms." A groove along the upper surface of each arm bears (in life) tentacle-like "tube feet" which are used in the capture of food.

Usually the body of the creature is supported by a jointed "stem" which attaches to the sea bottom.

CEPHALOPODS

The cephalopods include the living Nautilus, and the squid and octopus. The Nautilus bears a coiled shell superficially resembling that of a snail. Internally, however, it differs in being composed of a series of chambers, in the last (and largest) of which the living animal is found. As the shell grows, and a new chamber is added, the animal moves into it.

In the Paleozoic era, the ancestors of the Nautilus were abundant, and exhibited an interesting evolution. Beginning with forms having a straight shell and simple suture lines marking the growth chambers, the successive forms exhibited increased coiling until the Nautilus type was achieved.

As an outgrowth of the Nautilus type came the Ammonite group which flourished and died out in the next era, the Mesozoic

LAOPORUS WYLDEI

A clear imprint of the left hind foot of this tiny reptile, and a faint impression of what may be the left front foot.
Other small prints on the slab are of a small amphibian, probably Microsauropus.

Permian

Castle Peak, Texas

MICROSAUROPUS ACUTIPES

One of a group of primitive salamander-like amphibians which died out at the end of the Paleozoic Era.

The 4-toed imprints represent the front feet, the 5-toed, the hind. The line between the left and right footprints is the "tail-drag."

Permian

Castle Peak, Texas

VARANOPUS (DIDACTYLUS?)

The obverse of a foot-print of an early reptile, -- apparently two-toed.

Permian

Castle Peak, Texas.

VARANOPUS IMPRESSUS

A primitive, 3-toed reptile.

Permian.

Castle Peak, Texas.

DERMAL DENTICLES

Scale-like structures of a primitive fish, *Petrodus occidentalis*.

Upper Carboniferous

Guthrie Co., Iowa.

PRIMITIVE SHARK

Edestes giganteus

Teeth (impressions) and fragment of jaw bone.
In this shark, teeth occurred down the center of the jaws.

Upper Carboniferous

PRIMITIVE RAY-LIKE FISH
Petalodus destructor

This type of fish presumably fed upon shell-fish, using these heavy "pavement teeth" to crush the shell.

Upper Carboniferous

Guthrie Co., Iowa

AMPHIBIAN AND REPTILE FOOTPRINTS

Over 200 million years ago, primitive amphibians and reptiles walked across the Permian mud-flats in the area we now call Texas. Their footprints were preserved as the muds hardened to form these shales.

The characteristic red color of the "Texas Red Beds" is thought to be associated with an arid climate during the Permian. Seas and lakes were evaporating, precipitating salts and oxidizing the sediments.

FISH TEETH AND DENTICLES

Primitive relatives of the sharks and rays have left their record in the rocks of Upper Carboniferous age (approximately 270 million years old).

PELECYPODS

The Pelecypods, or bivalved mollusks differ from the Brachiopods or lamp shells in that the two halves of the shell are right and left, rather than upper and lower.

The Pelecypods appeared slightly later in Paleozoic time than their snail-like relative, the gastropods, or the more abundant lamp shells, and occupied a minor role throughout the era.

GASTROPODS

The gastropods, or snail-like mollusks, had their beginning in early Paleozoic time.

During the entire era, however, they were never very abundant. Through the millions of years which have elapsed since the beginning of the Paleozoic, the gastropods have gradually increased in numbers and variety until at the present time there are over 20,000 species living.

Care

PLANTS OF THE PALEOZOIC ERA

Marine algae are the characteristic plants found in the rocks of early Paleozoic age. Land plants became abundant in the middle Paleozoic and assumed forest proportions in the later periods of the era. All vegetation of this time, however, was primitive in character.

The first land plants were spore bearers. The most primitive were rootless, and leaves were either absent or spiny in form. Plants related to modern ferns, horsetail rushes, and club mosses were dominant through the middle and upper Paleozoic, the later forms attaining heights of 60 to 100 feet.

The first of the seed-bearing plants were the Devonian seed ferns, which may have been ancestral to all later seed plants. Primitive gymnosperms, the Cordaitales, also appeared in the Devonian. They were intermediate in character between the seed ferns and the true conifers, and the naked seeds were borne in flower-like clusters, not in cones. The leaves were strap-shaped with parallel veins.

The first true coniferous trees appeared almost at the end of the Paleozoic, in the Permian period, but were not well represented until the following era.

THE PALEOZOIC ERA

The Paleozoic was an important era to the student of paleontology. In its earlier periods (Cambrian and Ordovician) marine life occurred plentifully, but there were no backboned animals, and no evidence of life on land, either plant or animal.

In Silurian time (Middle Paleozoic) back-boned animals began to appear in the oceans. The first indication of land life occurred in the form of simple rootless plants, and, in the animal kingdom, scorpions and millipedes.

The Devonian period, which succeeded ^{many} the Silurian, was characterized by the occurrence of ~~quantities of~~ primitive fishes. The first amphibians also appeared at this time, and became abundant and large in the following period (Carboniferous).

double space Reptiles apparently originated in the Carboniferous and increased in specialization throughout the Permian period, finally rising to dominance in the succeeding era.

INVERTEBRATES OF THE PALEOZOIC ERA

Although most of the main groups of marine invertebrates which are known today were represented in the Paleozoic era, the types found and their relative abundance were considerably different than they are at present, giving the early fauna an entirely different aspect.

The arthropods were represented in great abundance by the trilobites, primitive forms which might be said to have taken the place of the lobsters and crabs at that early time.

Clam and snail-like mollusks, dominant among shell fish today, were far outnumbered in the Paleozoic by the brachiopods, and the cephalopods.

↑ Lamp shells, or

The sea-lilies appeared in abundance, while their relatives the starfish and sea urchins were very rare.

Corals were of different types than those of today, the typical reef builders and the precious corals not being included.

Saber-tooth Cat -

American Lion - Larger than the African lion

Dire wolf - twice the size of the Timber wolf of today

Bear - Larger than the biggest Alaskan grizzly of today

Imp. Elephant - stood 13 ft. high must have required
— lbs. of food per day

Ground sloth -

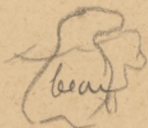
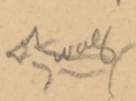
Camel - slightly larger than Asiatic camels today
which require — lbs. of food per year?

~~Man~~

So. California

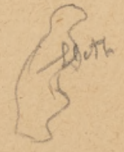
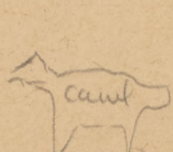
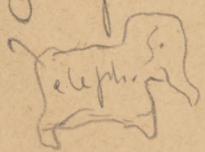
Yesterday

The great flesh-eating animals



Preyed upon

Large plant-eating animals



which lived on

The abundant vegetation of

This region 50,000 yrs. ago

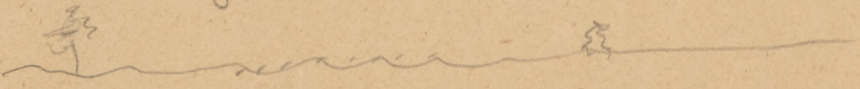
Today

These big carnivores are extinct
and ~~only~~ smaller ones exist here
~~nowhere~~ ~~the~~ ~~timber~~ ~~cat~~
Because

The big herbivores are extinct
and smaller ones are predominant

Because

The vegetation is less abundant



HAMMOND FLYCATCHER

A common but inconspicuous migrant found mainly in tree and brush covered canyons and mesas along the base of the mountains, during April and part of May and throughout September and October.

The breeding area is from northern California and Colorado to Alaska, the winter range from Mexico to Central America.

RING-BILLED GULL

This graceful gull breeds in the interior of northern United States and southern Canada and migrates to the Pacific coast in fall.

It arrives in southern California in September and remains until early May.

GAMBEL SPARROW

Probably the most abundant of our winter visitant birds, occurring in gardens and brushy localities throughout lowland and foothill regions from September to April. It summers in western Canada and Alaska.

CERULEAN WARBLER

SUMMERS from southeastern Canada to the Gulf of Mexico.

WINTERS in northern South America.

"I found (this) warbler entering the United States from Mexico early in April when it was in perfect plumage. On an island on which we landed about an hour before sunset, some hundreds had stopped to pass the night."

NASHVILLE WARBLER

SUMMERS in northeastern United States and
southeastern Canada.

WINTERS in Mexico and Guatemala.

"The flight of this little bird is short, light,
and entirely similar to that of numerous species
. . . . already described."

H. H. H. H.
LOS ANGELES COUNTY MUSEUM

EXPOSITION PARK

LOS ANGELES, 7, CALIFORNIA

RETURN POSTAGE GUARANTEED

Odd Labels from Bird show

E. J. D.

Pomona Jan

Exhibit

1941

Small (2 inch) cut-outs

color?

SAMOAN CORALS

SAMOAN FISHES

FORAMINIFERA

SHELLFISH

ECHINODERMS

ECONOMIC IMPORTANCE

HOW FAR DO BIRDS FLY ?

HOW FAST DO BIRDS FLY ?

OCEANIC MIGRANTS

MIGRATORY ROUTES OF TERNS

MIGRATORY ROUTES OF NORTH AMERICAN GEESE

SHEPHERD DOG AND MASTIFF TYPES

SPITZ-TERRIER TYPE

GREYHOUND TYPE

SCENT-HOUND TYPE

ANCESTRY OF DOGS

Dark blue

Birds
dark
blue

Dogs
dark
blue

① Topped by Title ①

CURRENT EXHIBITION IN THE SCIENCE ROTUNDA OF THE MUSEUM (buff)

Topped by
Title ②

② ONE OF THE MUSEUM'S RECENT FEATURE STORIES IN EXHIBITION (buff)

~~BRANCH~~

✓ HANCOCK PARK, A DEPARTMENT OF THE SCIENCE DIVISION OF THE LOS ANGELES COUNTY MUSEUM

color? Bright Blue letters on buff beaver board?

Topped by
Title ③

③ ILLUSTRATING THE MIGRATORY HABITS OF BIRDS

color?
buff

MODEL OF HANCOCK PARK AND THE ASPHALTUM POOLS OF RANCHO LA BREA } Buff?
WILSHIRE BOULEVARD AT CURZON

To go over
transparencies
of museum and
exhibit halls

Medium size letters (3 1/2 inch) CUT-OUTS

MUSEUM ACTIVITIES IN THE FIELD OF SCIENCE

color Bright Blue mtd on full
Beaver board

① HIGHLIGHTS FROM THE PARADE OF THE PACIFIC

(buff)

followed by
small letters
labelled ①

② FROM WOLF TO DOG

(buff)

followed by
small letters
labelled ②

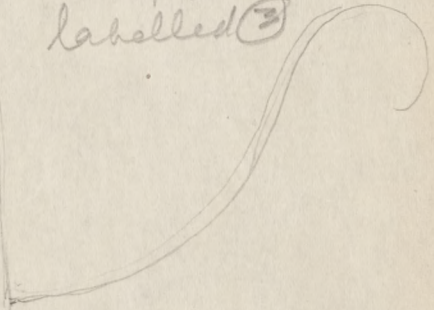
RANCHO LA BREA -- NOW HANCOCK PARK

color?
buff?

To go over the model
~~transparencies~~
of R.L.B.?

③ BIRDS OF PASSAGE —

~~buff~~
~~blue~~
followed by
small letters
labelled ③



Buff paper, bright blue letters
36 pt. caps.

DUCK HAWK 165-180 MILES PER HOUR
COLLARED SWIFT 100-150 ~~M.P.H.~~ ~~P.H.~~ ~~HOUR~~
GOLDEN PLOVER 60-70 M.P.H.
CINNAMON TEAL 40-60 M.P.H.
RUFIOUS HUMMINGBIRD 45-55 M.P.H.
BARN SWALLOW 25-45 M.P.H.
MOURNING DOVE 30-40 M.P.H.
CALIFORNIA JAY 20-30 M.P.H.

$\frac{1}{2}$ inch margins
all around
(top, bottom,
left & right)
make all strips
length of longest
wording and
change spacing between
name of bird & miles per hour
in order to get this

ARCTIC TERN FLIES 25,000 MILES
KNOT FLIES 12,000 MILES
WANDERING TATTLER FLIES 11,000 MILES
BANK SWALLOW FLIES 9,000 MILES
BOBOLINK FLIES 8,000 MILES
TENNESSEE WARBLER FLIES 5,000 MILES
BLACK-VENTED SHEARWATER FLIES 2,500 MILES
MT. PLOVER FLIES 1,400 MILES

in this longest one
leave no large
space between name
of bird & "flies"
in others leave space
so that all strips
are the same
length with
1 inch margins
2 left, right &
top & bottom

copied

Hill

smaller pectus

smaller limpet shield S. Calif

" cowry nut-brown " "

real oyster - S. Calif,

" clam

natural chiton

blue star fish - Samoa

Other bright ones?

can we take out forams

small sharks? Horned shark

BIRD MIGRATION

← 72 pt caps

A recent exhibition from the Department of Ornithology of the Museum's Science Division featured the results of the latest studies on the subject of the semi-annual movements of birds.

On the basis of records of extensive banding of birds now available from the United States Biological Survey, many migratory routes have been mapped, and peculiarities of movement observed.

Large
Vertical

36 pt

Blue letters
on buff

blue letters
on buff paper

← like does show size

Colors like Marine show
36 pt lc.
bright blue
on buff

The northern terminals of the routes mapped here indicate the breeding localities of these geese, while the southern areas represent their winter homes. The Black Brant, however, winters all along the coast south from Vancouver.

94

days 360
bird 75
titles
529

estimate 240 words for transparencies
105 " large marine labels
300 " small " " " " " "
645
30

645
230

Horizontal

Size
of
letters
+ margins

$\frac{3\frac{1}{2}''}{\text{cutouts}}$

Highlights from

The Parade of The Pacific

Current Exhibition in the Science Rotunda

$\frac{2'' \text{ cutouts}}{\text{Colored Buff}}$ of The Museum.

Color scheme
light blue card, blue letters
(Same as current Marine Ex.)

A Samoan Corals $\leftarrow \frac{2'' \text{ cutouts}}{\text{Colored Blue (DK)}}$ + painted

Background to be constructed or

Christy make groups

Labeling? — None?

B Samoan Fishes

~~Background to be constructed + painted~~

Same as "A"

Color — Dark blue? background
or Sea Green

Case 2 - Printed label by Miss Barbour
(Mollusca)

Case 4 - Echinodermus Printed label

Case 2 (Mollusca)

Shell fish = Label in cut-outs? (2 inch)

² ~~There are~~ In the Pacific ocean alone there are
Printed estimated to be over _____ different

(19) 36pc kinds of shell fish - ~~a mollusk~~

Shell fish are not fish in the strict sense of the word but soft bodied creatures which, lacking an internal supporting skeleton, make for themselves an outer covering of ^{hard} calcareous material - the shell.

model or drawing of animal in shell

As the animal grows the shell is added to as well.

This series of several pectens illustrates the changes one animal goes through in the course of development. Show series of pith or spear. Pectens or Tritonalia (Gastropod)

The shells in which these soft-bodied animals dwell are of hundreds of different shapes & sizes. There are, however, ⁽³⁾ basic types - 36 p. 5

Univalve - a single ~~shell~~ ^{structure}, coiled or straight
with ~~one opening~~ ^{show} multi-coiled Turritella

SHOW

" limpet
" snail like shell
" Dentalium

Bi-valve - having 2 halves to the shell

" typical clam - symmetrical
" oyster a symmetrical
" very ornate one?

Multi-valve - having several overlapping plates

" alitons

Case 2 cont'd

Practically every major division of animal life is represented in the seq.

One of the best known though little understood is the great group of shell fish - or Mollusca.

The shell is ^{the protective} ~~protection~~ covering ~~which~~ ^{forms about} ~~to serve as~~ ¹ ~~it lives, a shelter for~~
 which ~~is~~ ^{formed by} the animal itself, ~~a structure~~

Show model or drawing of animal in shell

As the animal grows the shell is added to ^{as well} ~~so that~~ ~~it is increasing size~~

This series of ^{several} ~~perfect~~ ^{or mails} ~~shells~~ illustrates the sizes one individual goes through in the course of development

Show series of fresh or near Peters or Tritonalia (snails)

CUT OUT

TYPE

BARBOUR
PRINT

3 BASIC Types

31 Multivariate

21 Bivariate

Univariate

18 pt. ?

36 pt.

18 pt.

Care 3 - cut-out? (2")
Echinodermus or "spiny-skinned" animals

~~at low tide may be found~~
~~clinging to the rocks at the~~
The "spiny-skinned" animals of the sea
such as the star fish are well-known to which
~~to all families with the rocky portions of our~~
~~coast~~ are familiar objects ~~to~~ along ~~the~~
rocky portions of the low tide line. There are, however,
(35) other kinds of Echinodermus living
in the Pacific ocean.

✓ Though star fish are usually found
adhering ^{tightly} to the rocks, they are capable of moving
about by means of hundreds of small ~~tubes~~ "feet."

✓ The mouth of the star fish is on its under
side, directly in the middle

star fish eating ?

✓ Brittle stars ~~a star fish like form though with the~~
~~arms sharply marked off from the~~
central disc of the body.
show

✓ Sea Urchin - spiny skinned forms without
the arms which distinguish the star fish

✓ over Sand dollar - like the five areas on the
back though not separated as in the star fish.

✓ | Crinoid? These forms have many branching
arms & a stalk by which they attach
- usually permanently to rocks at seabottom

Case #

variety of
 (4) A surprising number of objects of ^{common} everyday use are derived from marine animals & plants. a few examples ^{from the Pacific} are shown here. In addition to the few shown here, ~~there is~~ ^{whale} ambergris used in perfumery, ~~shells & oil~~

- ~~shell~~ Pearls - oysters
- Pearl buttons - mussel shell
- sponge - sponges
- Paripi? beads - coral
- Calcium - Diatomaceous
- chalk etc foraminiferous ooze
- cuttlebone - squid

Case #1 The earliest ~~records~~ ^{simple} of ~~marine~~ ^{simple} organisms life ~~represents~~ were of marine organisms and for millions of years there was no other ~~life on land~~

How old is marine life?

early marine invertebrates	Proterozoic	1500	million years ago	
marine invertebrates like trilobites	Paleozoic	460 340 300	"	" (340 million yrs. duration)
reptiles & ammonites	Mesozoic	140 150	"	" (100 million duration)
mammals	Cenozoic	60	"	" (60 " ")

Proterozoic
 Paleozoic
 Mesozoic
 Cenozoic

60,000,000

+ abalone

mussel - shells for pearl buttons

pearls - oysters (produced by secretions of the mantle
around a foreign substance (sand or
parasite))

Isabel
Squid - cuttle-bone

diatomaceous earth - } silver polish, talcum, chalk
foraminiferous ooze.

Sponges

corals - beads

Geese

Wackling

↳ Bl. Brant

↳ Ross

Am. Brant

unmounded

Blue goose

4

Terns

Auric 2 summer white

Foster's 2 summer white

Common 2 ad im

Least ♂, ♀, yg, 2 immat,

Oceanic Mig.

Sooty

Shearwater

Slender-billed

4

Pink-footed

11

Bristle-thighed Curlew

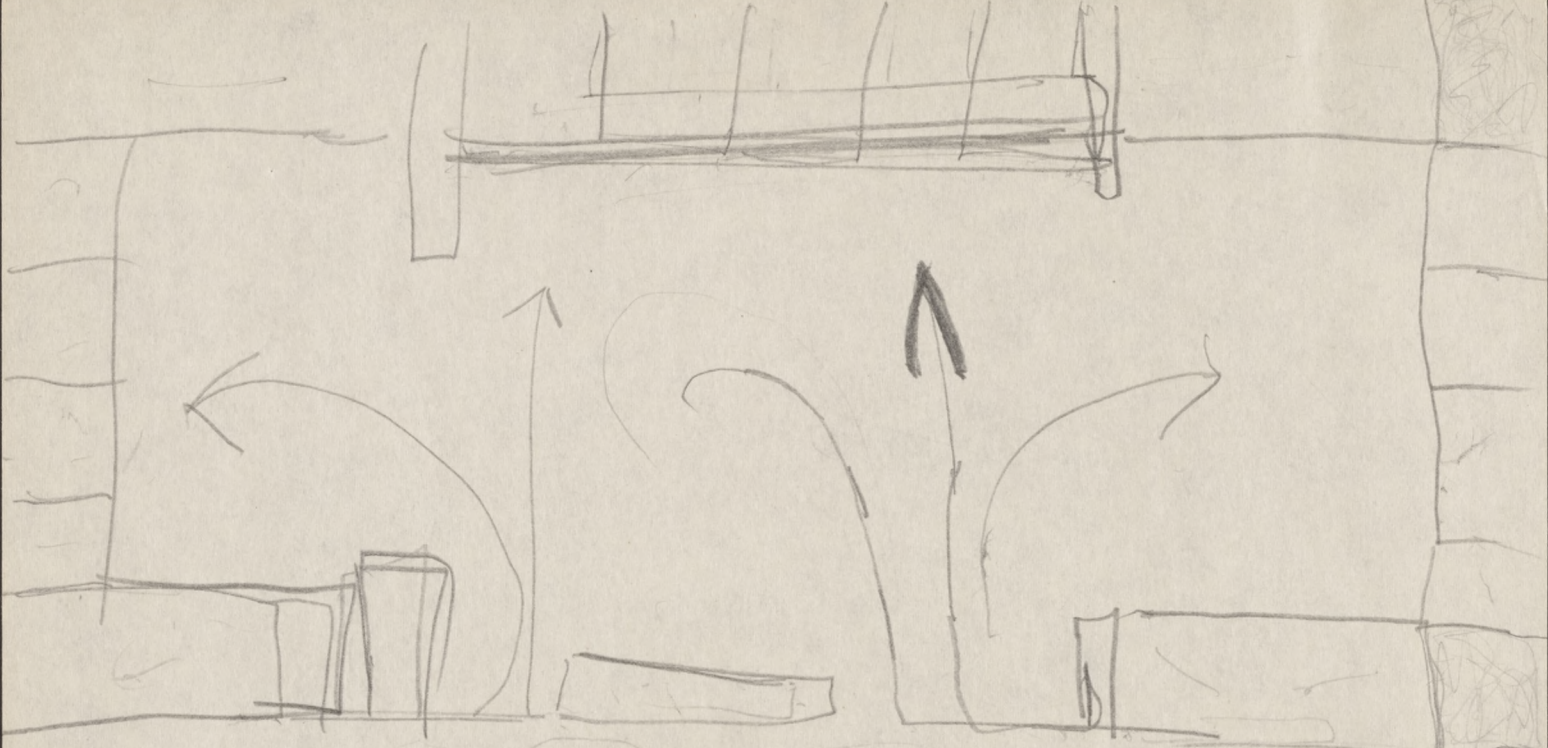
Pac. golden Plover 3

Pac. Godwit

Teal

Ouch Hawk

381
3
1.1 4 2



(goose)

~~Ferns~~

oceanic migrants

sex dif. & sim

seasonal dif

brilliance in plumage

feather structure

development of plumage

Labels for transparencies.

The Los Angeles County Museum ^{in Exposition Park.} ~~of History, Science and Art, in Exposition Park.~~

23 established in 1910 as an educational institution,
covering the fields of History, Science and Art.

of the

Rancho La Brea Hall occupying the science wing of the ^{first unit} ~~original~~ Museum building.

This famous collection of fossils from the La Brea asphalt pits on Wilshire Blvd. in Los Angeles, was the nucleus around which the Los Angeles Museum was first planned, in 1910.

31

The collection of fossils from the La Brea asphalt pits made by the Southern California Academy of Sciences was the nucleus around which the Los Angeles Museum was first planned, in 1910. With the extensive additions to the collection as the Museum took over excavation work of the pits have made the Museum and Rancho La Brea Hall famous the world over.

This famous collection of fossils from the La Brea asphalt pits is famous the world over.

40

North American Caribou Group. One of the number? educational habitat studies in the Museum's Hall of North American Mammals.

The combination of skilled taxidermy and careful background designing reconstructs a life-like picture of the animals in their natural surroundings.

94

~~Hancock Park, the site of the La Brea pits~~

Rancho La Brea - now Hancock Park

~~Hancock Park~~

The development of Hancock Park is
part of the Museum's Science Program

$$\begin{array}{r} 1.5 \\ 71 \overline{) 120} \\ \underline{71} \\ 490 \end{array}$$

Hancock Park a ^{branch} ~~part~~ of The Science Division
of the ~~Los Angeles County~~ Museum

$$56 \overline{) 120}$$

Raush La Brea Hall

The famous collection of fossils from the La Brea asphalt deposits, was the nucleus around which the Los Angeles Museum was first planned, in 1910.

La Brea Hall occupies the ~~old~~ ^{original} Science wing of the ~~original~~ Museum building, ~~at~~

~~Numerous Caribon groups in the North American mammal hall of the Museum.~~

~~This life-like display is ^{one} of the ^{educational} ~~most~~ ^{habitat studies} ~~how many~~ ^{different animals}~~

37 in the Museum's Hall of Mammals, mammal

The combination of skilled Taxidermy & life-like ^{artistic} ~~careful~~ ^{background} ~~com~~ ^{designs} ~~reconstruction~~ ^{produces} ~~picture of the~~ ^{animals} ~~in their~~ ^{surroundings.}

In 1924, Capt. G. Allen Hancock
presented ^{32 acres of} Rancho La Brea to ~~the~~ Los Angeles
County, to be made into a park ~~now~~ ^{to be}
called Hancock Park. ~~Plans call~~ ^{Plans call}
~~for~~ ^{the upper left hand corner} a museum building over
one of the pits, shown in ~~this~~ model.
There, one will be able to see the pre-
historic bones embedded in the hard
asphaltum as they have been for 50,000
years. (65)

~~Plans call for a~~
In 1924, Capt. G. Allen Hancock
presented 32 acres of Rancho La Brea to Los
Angeles County for a park. Located on
Wilshire Blvd near La Brea Ave., this
is now known as Hancock Park. Plans
^{include lifesize models of extinct animals and}
~~call for~~ a museum to be built over one
of the pits. ^{to show} ~~shown in the upper and sides~~
~~that one may see~~ the pre-historic bones
embedded in the hard asphaltum as they
have been for 50,000 years. 72

This model shows Hancock Park
just after the excavations were completed.
The little holes ^{indicates} ~~show~~ the position of the
pits, about 25 in number. The lake
in the lower corner ^{is the one} ~~seen~~ seen from
Wilshire Blvd. It is soft tar covered
with shallow water like it ~~probably~~
~~was thousands of years ago.~~

regular
size
lettering
arranged for

OK Museum Activities
in the field of Science

buff beaver
board strip
with bright
blue letters

SCIENCE
OK Large sign
5 ply
w. 10 in.

Rancho La Brea - Plans underway for -

high 5' x 7' wide
model - or map
Installation?
Label over model
Hancock Park a -
no auto letters
on track

Henry
see selection transparencies - how many? 6 (3 each side)
What size? $15\frac{3}{4}$ " square box

Miss Barbour
labels cream & ~~bright blue~~ letters
like ~~signs~~ labels blue main letters but cream paper
up to 50-60 words
one of museum

A sample of the information available from the departments
of scientific research
Ornithology - number of specimens in dept?

Scientific information
available to the public
one of the museum's dept.
Scientific dept.

① The largest & smallest of living birds are
included in the museum's collection
Condor - too tall to use?
Hummer?

② ~~Seasonal~~ Sexual differences in
plumage can be studied Mallards?

③ ~~Qualities in nests & eggs?~~ Brilliance of plumage

How far
④ The champion long distance
migrant is a close relative
of a bird that flies only — miles.

How fast
⑤ ~~OK~~
(over)

Graph for how far & fast
4' long x 2'

Bird Migration

A recent exhibition from the
Department of Ornithology of the
Museum's Science Division
featured ^{The results of the} latest studies on the ~~subject~~
subject of the semiannual movements
of birds. On the basis of records of extensive banding
of birds ^{The U.S. Biological Survey's}
now available from ~~extensive~~
¹ ~~banding of birds~~, many migratory
routes have been mapped, and
peculiarities of movement observed

Case 2. Migratory routes of Terns (see title or case 1)
get same data

Same as case #1
Small labels for each Tern - also case 3
Use Those already typed?
(blue letters on buff)
Retype? or what?

Blocks for Terns to stand on
measure for size

Colors to match stripping?

Antin-Blue
Common - orange
Red - least
green - Jost's

same as case #1
Restore stripping on map & cut map to size

Case 3 Oceanic migrants (see case 1 for data)
Small labels for each bird
see case 2

Same as case #1

Blocks for 6 birds in colors to match stripping?

Restore stripping & cut map down see case 2

Cases 4 & 5 Titles - cut-onto or what How far do birds fly
"fast" " " "

Labels for these cases - use typed one?

Printed letters - strips how long (letters to extend full length of strip?)
Color of strips - buff with bright blue letters

Slanting boards to put strips on

Size? Color? 47 wide, 26 high, color, colored buff.

5 cases of Birds - Color scheme?

As marine show labels

- (A) Label for the 5 cases
To be printed —
Size
Color

Case
① Migratory routes of North American Geese (Label)
Size of letters (printed or cut-out) also for cases 2, 3 & 4
Color

Have label explaining map printed
Size 36 pt. lc?
Color?

same for case 2 & 3 — Cut map down to size (find the size first)

Restore some stripping on map

Take similar stripping along to attach to geese

Mount geese how — right on floor of case?
Low Pedestal mounts

3 mtd

2 skins

squirrel
excav
cleaning
Boxes

~~a squirrel trapped within recent
years illustrates the method of excavation~~
Bats of kerosene were used ^{sand}
to clean the hardened asphaltum from

The fossils, ~~also~~ before they were brought to
71 The Museum for storage.

While the little ~~gambel~~ squirrel was trapped in a recent
tar pool, - 50,000 years ago ancient animals were

caught in similar fashions. With the passage of time
The asphalt hardened ~~so that the excavation of the~~
~~prehistoric bones began~~ ~~when the excavation of the~~

~~prehistoric bones began~~ ~~when the excavation of the~~
~~for their removal~~ ~~to remove the prehistoric bones~~

~~bones of the prehistoric creatures~~ ~~and~~

~~70~~ To remove the hardened ~~sand~~ asphaltum, the bones
were boiled in bats of kerosene before they were brought
to the Museum for sorting & storage.

so that excav. of the prehist bones required p. r. sh. work

65
66
45
176

BOND
RECORDED
INDEXED

Rancho LA Brea transparencies

Using large only

167

importance of the
The fossil-bearing deposits at Rancho La Brea ^{various scientific institutions} were first recognized in 1906 and excavations by the University of California, Southern California Academy of Sciences and Los Angeles High School followed soon after.

66
In 1913 Major G. Allan Hancock gave the Rancho to the County of Los Angeles ^{exclusive permission} and intensive excavation was begun by the Los Angeles County Museum ^{for excavation}.

58
The photograph above shows the southeast corner of the Hancock estate in 1913. Note the old barn at the upper left and numerous oil derricks in the distance.

51
1913 Mayor J. Allan Hancock gave the Rancho to the County of Los Angeles ^{exclusive rights} and intensive excavation was begun by the Los Angeles County Museum ^{at the Rancho}.

327

Though bones were numerous and closely packed together, excavation work was slow. Much of the tar-soaked sand was well hardened, requiring pick and shovel work. ^{while} underground water and tar seepage necessitated constant pumping of the "diggings" and led to frequent cave-ins.

51
The photograph shows reconstruction work following a cave-in of one of the larger pits. *illustrates the work involved in excavation*

84

45
It is estimated that well over ^{a million} 200,000 bones were taken from the asphalt deposits by the Los Angeles Museum alone. The largest of all of these were of the great Imperial Elephant (shown above) while the smallest included the tiniest of mice and birds.

Using large and small

167 -- as above

.....
166 . 196 . The asphalt which trapped the ancient animals must, at one time have been as sticky as ~~is~~ this small pool which within recent years entrapped a ground squirrel. However, with the passage of time, the fossil-bearing beds of mixed sand and asphaltum had become hardened and pick and shovel work was required for the removal of the prehistoric bones.

The upper view shows a fossil outcrop where excavations had just begun. The lower ones illustrate the work involved in excavation.

.....
63 . 137
.....
53 . 1424
.....
Of the thousands of specimens excavated at R.L.B. one of the most interesting was the stump of an ancient cypress tree found in place at a depth of feet. The largest animals found were the elephants (bones shown above), the smallest, included the tiniest of mice and birds. Bones were cleaned before bringing to the Museum for storage and study. The lower left photo shows cleaning vats, the one on the right the mass of material as first brought in to be sorted.

squirrel | excav

cleanly | boxes

about 4"x8" label

24 pt. lc
bright blue on
light blue paper
23

The shells in which these soft-bodied animals dwell are of hundreds of different shapes and sizes. There, are, however, three basic types.

STARFISH

BRITTLE-STARS

SEA URCHINS

BASKET STARFISH

SAND DOLLARS

top of card

Print singly as
headings on 4"x6"
paper (light blue)
with bright blue letters
24 pt. caps

24 pt. lc

about 4"x8" label

6" wide

30 Millions of square miles of ocean bottom -- to a depth of 2300 fathoms -- are covered with the abandoned shells of Foraminifera, major forming the ~~greatest~~ part of the deep sea oozes.

24 pt. lc
47 In the deep sea deposits of prehistoric times, many other types of Foraminifera were abundant.

Due to their minute size ~~Foraminifera~~ ^{they} are not destroyed by oil well drilling, and have thus come to be of great importance to geologists in establishing the presence of oil-bearing rocks.

6" wide

about 4"x8" label

100

all on this page → 24 pt

20 From the Pacific coast of North America alone there are estimated to be over ~~three~~^{two} thousand different kinds of shellfish.

38 Certain of the "spiny-skinned" animals of the sea, such as the starfish, are familiar objects along the rocky portions of the low tide line. There are, however, several other ~~kinds~~^{types} of Echinoderms living in the Pacific Ocean.

48
50 In addition to the many marine animals used as food, the sea has provided a variety of other items of common use -- such as: whale bone, whale oil, ~~ambergris from whales as a basis for perfume,~~ petroleum (the oil of ancient marine life), ~~buttons of shell,~~ chalk, sponges, pearls etc. etc. A few examples from the Pacific area are shown here.

48
30 Foraminifera are single-celled forms of animal life. Unlike other members of this primitive type, they enclose their tiny bit of living matter in a shell, often of intricate pattern.

30 Over 11,000 kinds of Foraminifera are known and most of these are no larger than a pin point.

Millions of square miles of ocean bottom are covered with the abandoned shells of Foraminifera, forming the major part of the deep sea ooze.

138
24
162
(over)
36 pt. lc
Bright blue letters on light
green blue paper (like Marine
show)

- 167 zoo — large with piles S. E corner Large
- 166 ground squirrel in asphalt (1)
- 63 tree stump (2)
- 124 men digging (2) Pit 3 removing caudal in material from center of pit
- 303 excavation ^{at 2/19/14} Pit 4 tar pool formed since pit abandoned (2)
- 53 cleaning (3) Feb 1914
- 58 oil derricks T post in foreground (1) looking N.W., Feb 1913
- 29 about the same looking N.W. (1) late T Ranch house
- 329 bones in place Pit 77 skull? pelvis (3)
- 327 (excavating with planks) cleaning out pit 67 after cave in of Feb. 22, 1915 Large
- 178 roofed excav. Pit 9, general view of pit & housing apparatus July 1914 (3)
- 196 ~~lost crop at east end late~~ (1)
looked north
- 84 Holland at work on eleph. pen Large
- 137 eleph. femurs (2)
- 1424 boxes of bones (3)
- sign

N Amer. Carbon Group

~~36pt~~
36pt 63
Fossil remains of dogs similar to those which today hunt on scent were found in deposits of Neolithic age in Switzerland and of Bronze Age in Lower Austria.

Historically, dogs of the hound branch of this type are described in the Greek writings of Xenophon in the 6th century B.C.. First mention of "Spaniels" is found in the Irish laws of 17 A.D.

~~24pt~~
36pt 17
Dwarfing occurring in the hound line has produced the Dachshunds of Germany and the Bassetts of France.

~~Even the fox-like Pomeranian is basically wolf-like~~
~~more like the wolf than the fox.~~

②
Man's use of dogs as protectors of home and property is of ancient origin. Crossing of the earliest domesticated form with northern wolf produced a large, fierce dog, well suited to this purpose.

36pt 62
162
198
360
With the domestication of sheep, the shepherd dog was developed and again crossed with wolf and with the older "guard dogs". From these various crossings came the great sheep dogs and mastiffs, while from the shepherd dog stock, unmixed with wolf came the breeds used as herders of sheep.

From Canis familiaris palustris, bones of which have been found in Neolithic deposits of Europe, have come the dogs of the Spitz and Terrier breeds.

Crossing of this type with northern wolves has given rise to the various large sled dogs, as well as to the Chow. On the other hand, stunting of growth under domestication has produced the dwarf breeds of the Orient and the toys of Europe.

Fox terrier ✓

Saluki ✓

Man's use of dogs as protectors of home and property is of ancient origin. The large dogs produced by crossing the early domesticated form with northern wolf were admirably suited to this purpose.

With the domestication of sheep, a breed of dogs especially adapted to the guarding of flocks was developed and again wolf crossing occurred. From these crosses have come the great sheep dogs and mastiffs, including also the St. Bernard and Newfoundland.

From the original shepherd dog stock have come the breeds used as herders of sheep.

A strange development of the mastiff type is the Bulldog whose short legs, bow-shaped body and under-shot jaw were originally developed for fighting. Exaggeration of these once purposeful characters has resulted in a modern dog of use only on the show bench.

The development of the greyhound or saluki type can be traced back thousands of years by means of ancient works of art. Of southern origin, it appears in northern prehistoric deposits only in the large form produced by crossing with the northern wolf.

Bred originally as fleet-footed hunters, modern descendants of this type are still the fastest of all breeds of dogs. It is interesting to note the dominance of the lean, slender-muzzled type in all crosses, regardless of size or coat.

dark brown on light night buff

(over)

1 Bird migration label — goes outside & can wait?
359

1 geese label type? mtd in inside — do now
35

4 Marine labels mtd " " " "
162

6 Transparency labels goes outside
94 mtd?
+ 164
254

1 label about Hancock Park goes outside
65 mtd?

lettering of chart strips — have Kanahoff do?
53

dogs
105

417
53
670
65
735

167 Large ~~one~~

The fossil-bearing deposits at Rancho La Brea were first recognized in excavations by the University of Calif., ~~Calif.~~ Academy of Sciences & Los Angeles H.S. followed soon after.

With the donation of the Rancho ^{was donated} to the County of Los Angeles by Mayor Hancock in 19 excavations ~~by~~ ^{with} ~~that~~ ^{the} ~~intensive~~ excav. was begun ~~by~~ ^{by} the L.A. Mus.

85 The photograph above shows ~~"Hancock Ranch"~~ as it was in 1913. The South east corner of the Rancho in 1913. Note the old barn at the upper left & numerous oil derricks in the distance

327 ~~Excavations lasted two years~~
~~Excavation~~

Though bones were numerous & ^{loosely} ~~tightly~~ packed together, excavation work was slow. Underground water & tar seepage necessitated constant pumping of the "digging" and led to much of the tar-soaked sand was well hardened requiring pick & shovel work, ~~and~~

50 ← frequent cave-ins so that considerable construction work was necessary

84. It is estimated that ~~at least~~ ^{well over} 200,000 bones were taken from the asphalt deposits by the ~~N.A.~~ Museum alone.

The largest of all of these were those
43 ~~great bones of the~~ the great Imperial
Elephant, while the smallest included
the tines of mice & birds.

(2)

alone ^{just} ~~thought~~ The asphalt at ~~one time~~ ^{which happened the ~~very~~ ancient ~~last~~ animal} must have been as sticky as is found ~~today~~

~~small animals~~ to This small pool
~~Mr. J.B. Smith~~
which within recent years entrapped ~~the~~ ^a ~~ground~~ squirrel, ~~at the time of~~ ^{with the passage of time} However, the fossiliferous ~~asphalt~~ beds of mixed sand & asphaltum ~~which yielded the~~ ^{had become} ~~were~~ hardened & required pick & shovel work ~~to the~~ ^{for the} removal of the bones.

79

The upper view shows a fossil outcrop where excavations had just begun.

The lower ones illustrate the work involved in excavation.

166	196
124	327

(1) use large photo 167 see other side

(3) Of the thousands of specimens excavated at Rancho La Brea, one of the most interesting was the stump of an ancient cypress ~~tree~~ ^{found} ~~root~~ in place at a depth of — feet ~~in the center of the pit~~.

The largest animals found were the elephants & mastodons, ^(bison) the smallest included the tiniest of mice & birds.

94

~~The bones were~~ Before bringing the bones to the Museum for storage & study, they were cleaned as much as possible in vats of kerosene. Cleaning operations are shown to the left, the mass of material as first brought in to be sorted on the right.

glass ht 3' 1"
actual " 5' 1"

Spitz &
Society

Eng. Bulldog Spanish

Greyhound-type

Harry Tarrice

mantle type Secret-horned
type

type

Spaniel

Spitz

Pömler

Bulldogs

Chinese days

Shepherds

sheep dog

Bogor

Terriers?

Dachstein

Indian Dog

Mexican Hairies

Zeller

Terriers

Scotty, Airedale, Fox Terrier
Dobermann, Boston

Dobremam, brotom

Skitz skitz Terrier

~~Bulldogs Martini~~

collie & Shepherd

Scent-ho

Bozoi — Greyhound

Saw oak

General.

~~Travel~~

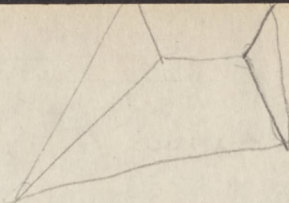
shell

estus

— 22 —

Greyhounds type enlarged

use chart and photos of all
forms of grey hound type



Spitz Terrier

Spitz

Scotty

Enlarge chart

Mastiff type

Enlarge chart

use Eng. Bulldog only

Scout-hound

Combine Pointer & Spaniel charts

use Spaniel skeleton

Cut-outs use as fringe?

Antique chart on wall area?

Wolf skin (& skeleton?)

collie skeleton & photo

Mex. Hairless & photo

2" Cut-out 3 2
 Special Museum Exhibit
 Highlights from
 "Parade of the Pacific"

2" Current ~~Exhibition~~ Exhibition in the Science Rotunda
 of the Museum

A Samoan coral group

B Samoan fishes ~~group~~ dark blue back group? fish on wire

① Kinds of sea life - Every phylum represented
~~Marine~~ ~~to whales~~

~~Fish~~ shells, starfish, corals

Practically every major division of animal life has some representative which lives in the sea.

shell home for an animal

develop shell fish model or drawing of animal in the shell

- ✓ Protozoa - Forams - oozes
- ✓ Porifera - sponge -
- ✓ Coelenterata - corals, sea fans, anemones
- ✓ Ctenophora - OK up no specimens however
- ✓ Platyhelminthes - OK " " " "
- ✓ Nematelminths - ? " " " "
- ✓ Nemertinea - OK " " " "
- ✓ Rotifera - " " " "
- ✓ Bryozoa - use
- ✓ Brachiopoda - use
- ✓ Echinodermata - Starfish, sea urchins, etc.
- ✓ Annelida - worms casts on pedestals diff kinds model of ann.
- ✓ Mollusca - shells
- ✓ Arthropoda - crab, lobsters
- ✓ Chordata - fish, etc.

② Economic value of marine life list in label, other thing

OK use chart?

- ✓ ~~Forams~~
- ✓ Pearls
- ✓ etc etc
- ✓ Diatomaceous earth - talcum
- ✓ fishing
- ✓ sponges
- ✓ beads - coral
- ✓ squid - cuttle bone

(2) How old ~~are~~ is marine life?
Fossils from every period.

(3) ~~Types of shells?~~
Relative abundance of ^{sea life to} land life
chart background
size?

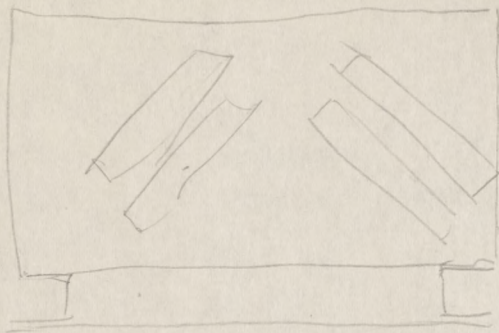
(4) ~~Size of marine animals~~

(4)

	ht	length	width
Wolf -	26" X	4' plus	X ap. 14"
Sett	20 1/2" X	4' "	X 12 "
Wolf shel	27"	3' 7"	9 1/2 "
Sett shel,		4' 6"	8" "

48
16
64

48
3



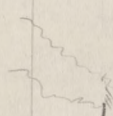
6' $2\frac{3}{4}$ "

3' $\frac{1}{2}$ "

[Handwritten signature]



wolf skin



4' plus

27" ht



wolf skeleton

3' 7"

9' $\frac{1}{2}$ "

27" ht

case
label

Dalmatian

photo

34' $\frac{1}{2}$ "

10' $\frac{1}{2}$ "

raise wolf to 36" ?
by blocker step of 10" ht

4" difference
in level

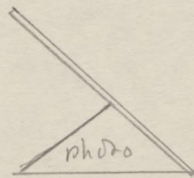
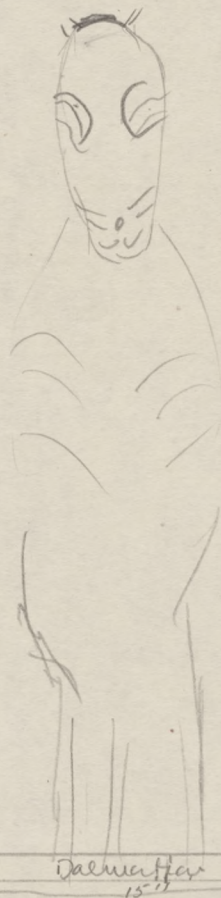
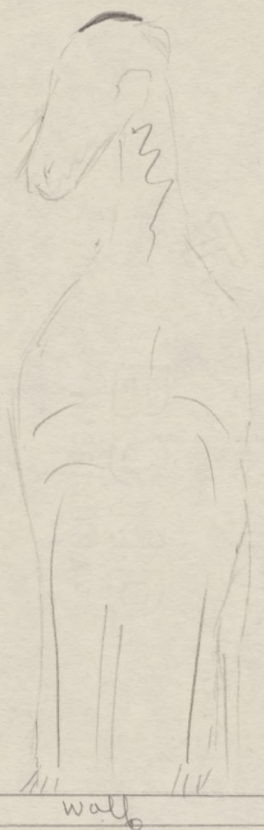
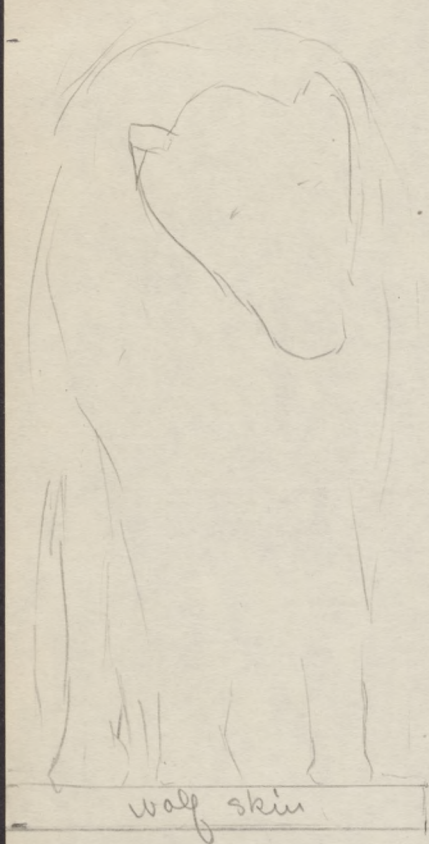
5' $\frac{1}{2}$ " raise skeleton
5" (sitting at 32")

4' $\frac{1}{2}$ " difference
in level

dog on bottom
ht 27' $\frac{1}{2}$ "

1" = 1 ft

over



wolf skin

10"

wolf

5"

15"

15"

dalmatian
15"

51 1/2"

3 1/2'

2" = 1 ft

Archeozoic - no fossils

Proterozoic

③ Scent-horned type

Dachshund skeleton & photo?

④ Shepherd-dog type

use Shepherd skull

" Bulldog "

~~Highlights from~~
~~the Exhibition~~

"From Wolf to Dog"

Museum's recent scientific
One of the feature stories in exhibition

- A Fossil history - floor built in
- B Wolf skin, skeleton, dog skeleton Build
Background
- ① ~~Spitz-Terrier~~ Type
Chart ~~across~~ covering background
Photos of Spitz & Scotty?
Skulls of Spitz
Terrier
Pug
Chow

- ② Greyhound Type
Chart across back
Photo of "Brace of dogs"
Skull of Saluki

In 1924 Capt. J. Allan Hancock
gave the site of The Rancho La Brea
fossil beds to The Los Angeles County
Museum. It is now known as Hancock
Park. This famous spot is ^{maintained} ~~these~~ ~~developed~~
as a scientific.

The northern specimens of the rarer mammals here
indicate the breeding localities of these forms, while
the southern ones represent their winter
haunts. The Black Bears, Lynxes, winters are
along the coast from Vancouver.

825

276 art labels to be done

400 History

645 Sci

$$\begin{array}{r} 2 \overline{) 1321} \\ \underline{56} \end{array}$$

- 1321

529

1850

400

$$2 \overline{) 2250(11}$$

276

400

700

1376

400

$$\begin{array}{r} 200 \overline{) 1776(8} \\ \underline{1600} \end{array}$$

THHIII

MEZZANINE CASES

Fossil plants

Dinosaur and etc.

Fossil Insects

Paleozoic Invertebrates

Jurassic & Triassic Invert.

Cretaceous invertebrates

Oligocene & Eocene Shells

Miocene birds

Desmo-
stylus
& Teeth
Miocene
Fishes
Miocene

Whale skull

Miocene Shells

Pliocene Shells

Pleistocene shells

Pleistocene shells

Specimens used in exhibit of fossils of California
 accompanying Dr. Stock's map in Westways, Aug. 1940
 *numbers refer to number on map

Hill	Inyo Range Cambrian Trilobite (15)*	Stock	Santa Rosa Island Ice Age Dwarf Elephant
Mezza nine	Carpinteria Ice Age Pine Cone	Stock	San Diego Eocene Small Titanotheres (4) Tooth
Hill	Santa Monica Cretaceous Invertebrates	Stock	Northwest Fresno County Cretaceous Long-necked Plesiosaur Thigh bone (14)
Hill	Calistoga Pliocene Petrified Wood	Stock	Titus Canyon, Death Valley Oligocene Thoracic Vertebra of Large Titanotheres (17)
Hill	San Pedro Ice Age Fossil Sea Shells	Stock	McKittrick Ice Age Lower Jaw of a long-legged llama (7)
Hill	Yuha Buttes Miocene Oyster	Paleo	Shark's Tooth Hill Miocene Shark Teeth (9)
County room	Petrified Forest Pliocene Petrified Palm and Paleo - Jaw of Hyaena-like Wolf (<i>Osteoborus nicardensis</i>)	Paleo	Lompoc Miocene Fish in Diatomaceous shale
Stock	Simi Valley Eocene Tarsiid Primate (1) Lower Jaw		
Hill	Santa Margarita Miocene "Giant oysters and curious seacows (6)" (<i>Desmognathus</i>)		Teachers' Institute Exhibit 2nd floor lecture hall October 9, 16 and 23
La Brea Hall	Rancho La Brea Ice Age Teratornis (2)		
Paleo	Barstow Miocene 3-toed Horse (11)		

Cut-outs used in evolution of dog in center section "From Wolf to Dog"

June 9 - July 28, 1940

EOCENE

40,000,000 years ago

Ancestor of Dogs and Bears (Miacis)

OLIGOCENE

35,000,000 years ago

First "Bear dog" (Daphaenus) -- skull used (CalTech)

Grandfather of dog family (Cynodictis) -- skull used (Cal Tech)

MIOCENE

20,000,000

"Bear dog" (Hemicyon) -- skull used (Cal Tech)

Father of the Dog Family (Tomarctus) -- skull used (Mus. prop.)

PLIOCENE

10,000,000 years ago

Early Hyaena-like dog (Osteoborus) -- ramus of jaw used (CalTech)

Hyaena-like Dog (Hyaenognathus) -- portion of upper jaw used (Tech)

PLEISTOCENE

40,000 years ago

Coyote (Skull in recent section)

Labels

Wolf, Dire Wolf, Fox

RECENT

Began 25,000 years ago

Jackal (at edge of recent) -- recent skull used (LHMiller)

Fox -- skull used (LAM)

Wolf -- skull used (MVZ)

Primitive Dog -- skull of Dingo used (LHMiller)

RECENT

10,000-6,000

Spitz-Terrier Type -- skull of Indian Dog used (LAM)

Greyhound-Saluki Type

Scent-hound Type

Herdsman's Dog or Mastiff Type

Shepherd-dog Type (latest)

-----AND from these the various breeds of today

Cut-out dogs used around map in center for "From Wolf to Dog" Exhibit

Wire-haired Terrier	England
Manchester "	"
Whippet	"
Collie	"
Mastiff	"
English Bulldog	"
Pointer	"
Bedlington Terrier	"
Foxterrier	"
Greyhound	"
Airedale Terrier	"
Bloodhound	"
Bull Terrier	"
Spaniel	Spain?
French Bulldog	France
Poodle	"
Great Pyrenees	"
Brussels Griffon	Belgium
Boxer	Germany
Schnauzer	"
German Pointer	"
Doberman Pinscher	"
German Shepherd	"
Dachshund	"
Spitz	"
Pomeranian	"
St. Bernard	Switzerland
Great Dane	Italy (No.)
Maltese	Is. of Malta
Samoyed	N.W. Russia
Golden Retriever	Russia
Borzoi	"
Saluki	Persia
Afghan Hound	Afghanistan
Rampur Hound	India
Lhasa Terrier	Tibet
Chow	China
Pug	"
Pekingese	"
Japanese Spaniel	Japan
Siberian Husky	Siberia
Malamute	Alaska
Mexican Hairless	Mexico
Chihuahua	"
Retriever	Labrador
Newfoundland	Newfoundland
Boston Terrier	New England
Eskimo	Greenland
Irish Water Spaniel	Ireland
Kerry Blue Terrier	"
Cairn Terrier	Scotland
Skye Terrier	"
Dandie Dinmont Terrier	"
West Highland White Terrier	"
Scottish Terrier	"

Cases of outer rim of circle in "From Wolf to Dog" exhibit

A -- 1st case to right from La Brea hall entrance
WOLF -- mounted skin only

A small WOLF was probably the original source of our domestic dogs. Presumably first domesticated in the Mediterranean region, he accompanied man northward about 10,000 years ago. Further crossings with large, northern wolves have produced many of the larger types of dogs, though most modern breeds may be traced back to the first domesticated stock without further introduction of wolf blood.

.....
AB see over - case with Setter skin and skeleton 2nd case

.....
B -- 3rd case
St. Bernard and Toy Manchester -- skeletons and 8 x 10 photos

The variations exhibited among the modern breeds of dogs are numerous. The ST. BERNARD and TOY MANCHESTER TERRIER are excellent examples of extremes of skeletal development. The sturdy-boned, great St. Bernard bred for strength as a work dog, is a strong contrast to the slender-limbed toy produced to satisfy "milady's" fancy.

C -- case to right of old entrance to rotunda from outside.
Skeletons of Wolf, coyote and fox, no photos

Though of varying size, color and coat, domestic dogs are of essentially the same structure as wolves. The general sturdiness of the bones, and particularly the wide, heavy head are wolf-like as compared for example with the slenderness of the coyote or fox.

D -- case to right of history hall entrance to exhibit
INDIAN DOG -- skeleton only

This dog, whose skeletal remains are found in prehistoric Indian kitchen middens on the islands off the coast of California, shows relationship to the prehistoric dogs of Europe and Asia. It possibly came to America from the latter continent about 4000 B.C.

E -- next case to right
MEXICAN HAIRLESS -- skeleton and photo (8x10)

A variant of the prehistoric Indian Dog in which hairlessness is due to retention of the embryonic conditions of the skin. Often associated with this peculiarity are dental abnormalities and reduction in number of teeth, as evidenced in this skeleton. The Mexican Dog is distinct from the Turkish or Egyptian Hairless Dog.

AB Large glass case opposite Board of Governors door.
SETTER -- skin and skeleton, no photo

The SETTER is a development of the spaniel type, trained to "set" -- that is to mark quietly the position of game, rather than to "flush" it. Taller than the Spaniel, he can scent game at some distance. He was originally used when netting birds was in fashion, through the 17th and 18th centuries.

The slender skeleton of the Setter provides the basic frame-work for the familiar slim lines of this fast field dog.

Art section

1st to right of art door
Metal statuette of Great Dane

GREAT DANE
Roman metal statuette
1st century A.D.

Loaned by Victor Merlo

.....
Chalice

FIGURE OF A DOG
On chalice of Arretine Ware
1st to 2nd centuries A.D.

Loaned by Victor Merlo

2nd -- reproduction of cave painting
ANCIENT AFRICAN HUNTING DOGS
Facsimile of Fezzan cave painting, Prehistoric

3rd -- Han Dynasty earthenware dog
CHINESE DOG
Han Dynasty, 200 B.C. - 200 A.D.

FROM WOLF TO DOG EXHIBITION — JUNE 9 — JULY 28, 1940

① SHEPHERD DOGS

BACKGROUND — GREY

STRIPS — RED

PICTURES — RED EDGES

SKELETONS —

COLLIE AND GERMAN
SHEPHERD

Big glass case

PANEL —

6' Long x 3' 11" High

CHART

4' Long x 3' 11" High

[] - LABEL

[] - PHOTO

1st case to right on
entry from La Brea hole

GERMAN
SHEPHERD

Intensive breeding
was begun in 1891 to
Establish a typical
German breed of
Shepherd dog

Photo

German
Shepherds
1888

Collie

Photo

Already well
Established in
19th Cent A.D.

Photo

Shepherd-dog
type — 4000 B.C.

Photo

Prehistoric Dog
Europe 8000 B.C.

Labels

Breeders of the GERMAN SHEPHERD DOG paid particular attention to body proportions and leg length in order to develop a dog with a long, steady, loping trot capable of turning quickly in rounding up sheep. Today he is used in many other lines of activity including that which has given him the well known title of "Police Dog!"

Originally as useful a shepherd dog as the German Shepherd, the graceful show COLLIE of today lacks the strength and elasticity of his forbears.

FROM WOLF TO DOG EXHIBITION - JUNE 9 - JULY 28, 1940

② BORZOI CHART

BACKGROUND - RUST

STRIPS - ORANGE

PICTURES - ORANGE EDGES

Open case

Grayhound

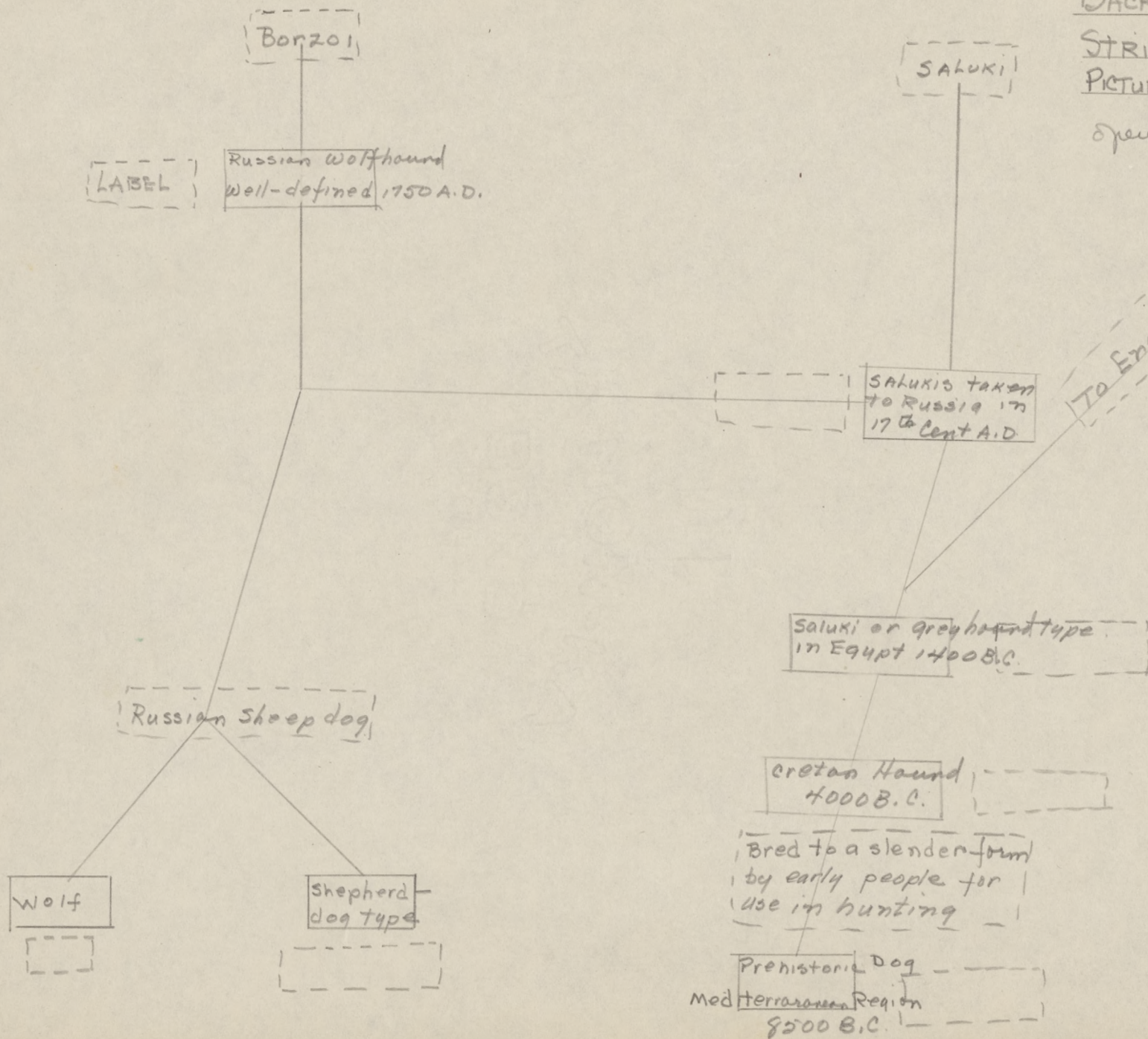
To England

PANEL AND CHART —
6'6" long x 3'11"

[] - LABEL

[] - PHOTO

SKELETON - BORZOI



LABEL

The BORZOI, or Russian Wolfhound, originally bred as a hunter of wolves, has the long muscular legs and deep chest of a tireless runner. His head, though very slender, is equipped with powerful jaws for holding his prey.

FROM WOLF TO DOG EXHIBITION - JUNE 9 - JULY 28, 1940

③

SHEEP-DOG CHART

BACKGROUND - GREY

STRIPS - RED

PICTURES - RED EDGES

ACTUAL MEASUREMENTS

OF CHART:

4'2" LONG X 3'11" HIGH

ON PANEL

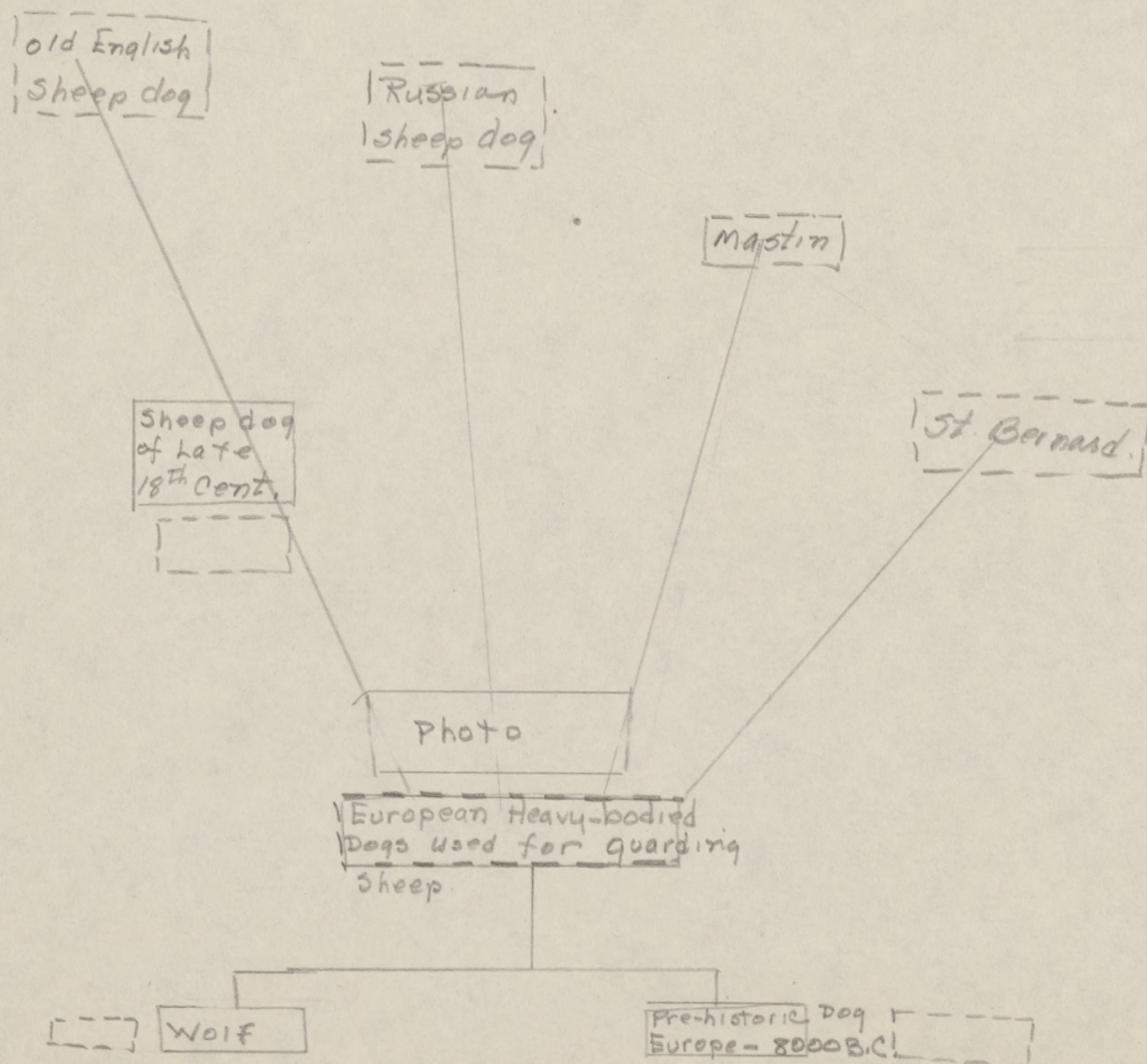
6' LONG X 3'11" HIGH

Rug class case

[] - LABELS

[] - PHOTO

SKELETON - OLD ENGLISH
SHEEP DOG



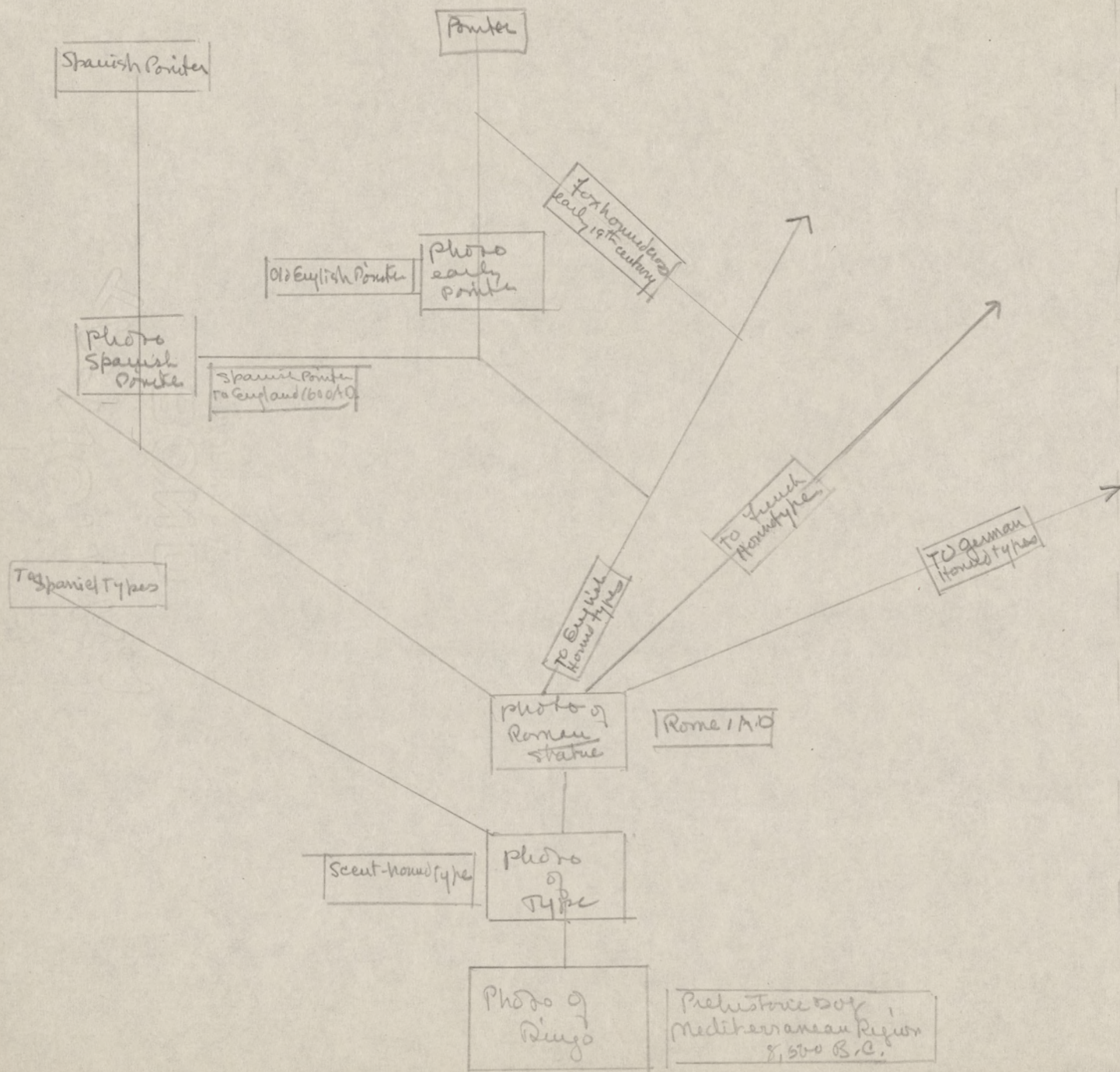
Since man first domesticated sheep, dogs have accompanied the flocks, either to guard against marauding wolves, or to head the sheep. The OLD ENGLISH SHEEP DOG, bearing northern wolf blood, is of the guard-dog type and shows a massive structure. The smaller, more lithe Shepherd Dogs are the herders.

From Wolf to Dog Exhibit June 9 - July 28, 1940
Panel 6', about 4' x

④ red strip on gray board
Pointer

accompanied by
skeleton and
8x10 photo

Big glass case
gray background
red strip



The POINTER and Setter have many points in common and it is even likely there is some Pointer blood in the lineage of the Setter. However, the body of the short-haired dog is somewhat sturdier, reflecting the long line of ancestors which stood in a rigid position to point game, while the forebears of the Setter marked game from a crouch.

FROM WOLF TO DOG EXHIBITION - JUNE 9 - JULY 28, 1940

⑤ SPANIELS

BACKGROUND - RUST

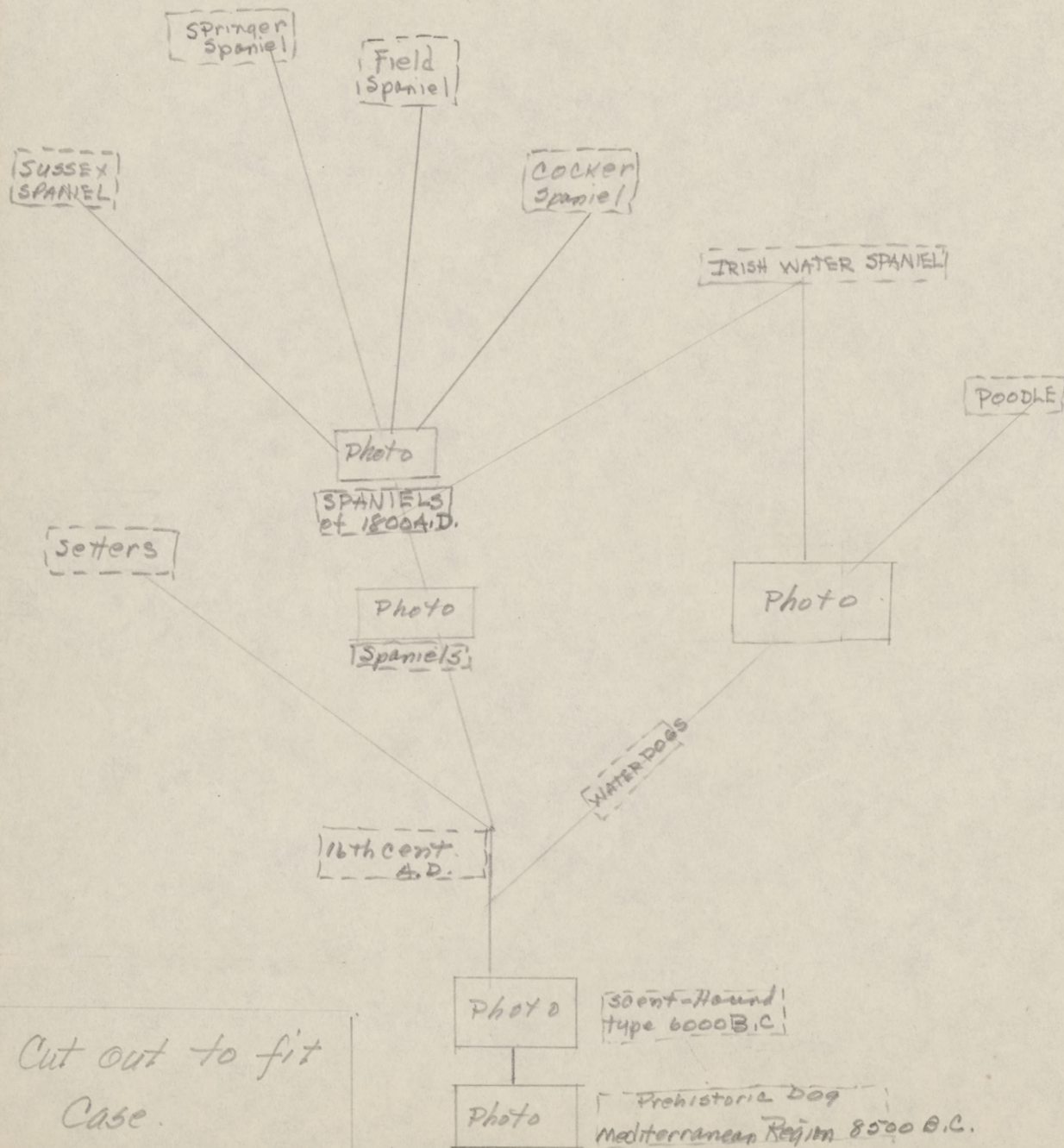
STRIPS - ORANGE

PICTURES - ORANGE EDGES

SKELETON - COCKER

PANEL AND CHART

3'5" Long X 3'10" High



Cut out to fit
Case.

Label

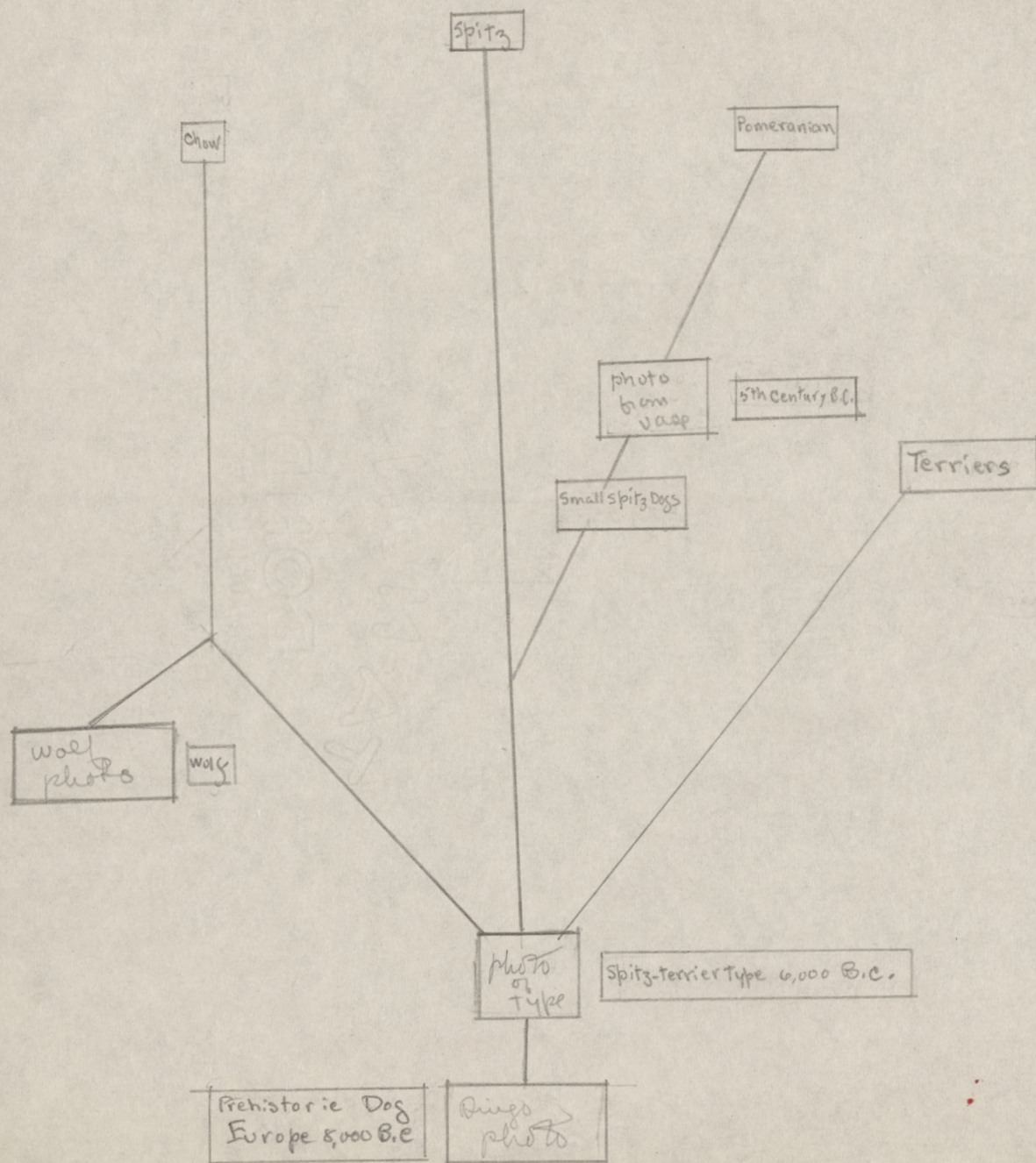
SPANIELS, in contrast to their close relatives, the Setters, have been developed to "flush" or "spring" game - hence the early origin of the name Springer Spaniel. Their small size enables them to follow on scent through bushes. Trained also as retriever, the jaws of the spaniels, though firm, are very gentle.

Green Wolf to Dog - Exhibition June 9 - July 28, 1940
 full length of background 6' - chart occupying $4' 1\frac{1}{2}"$ x $3' 11\frac{1}{2}"$ (ht) on 6" base

⑥ Spitz Type

accompanied by
 skeleton of Spitz
 " " Pom
 " " Chow
 and 8 x 10 photo
 of each

gray background
 red striping



LABELS

The SPITZ type, (meaning "pointed-nosed") is of great antiquity and, crossed with the northern Wolf, undoubtedly gave rise to the various sled dogs of Siberia and America as well as to the Chow of China.

The POMERANIAN is merely a toy Spitz, which has replaced its larger relative in popularity.

Note the greater breadth of the CHOW skull, reflecting its added wolf blood.

From wall to dog Exhibition - June 9 - July 28, 1940
 Full panel for chart 6'5 1/2 x 5'4" (just lined) Photos 4 1/2" from top)

⑧ ORIGIN OF TERRIERS

Rose background
 with blue
 strips &
 blue edges
 on photos

No skeletons

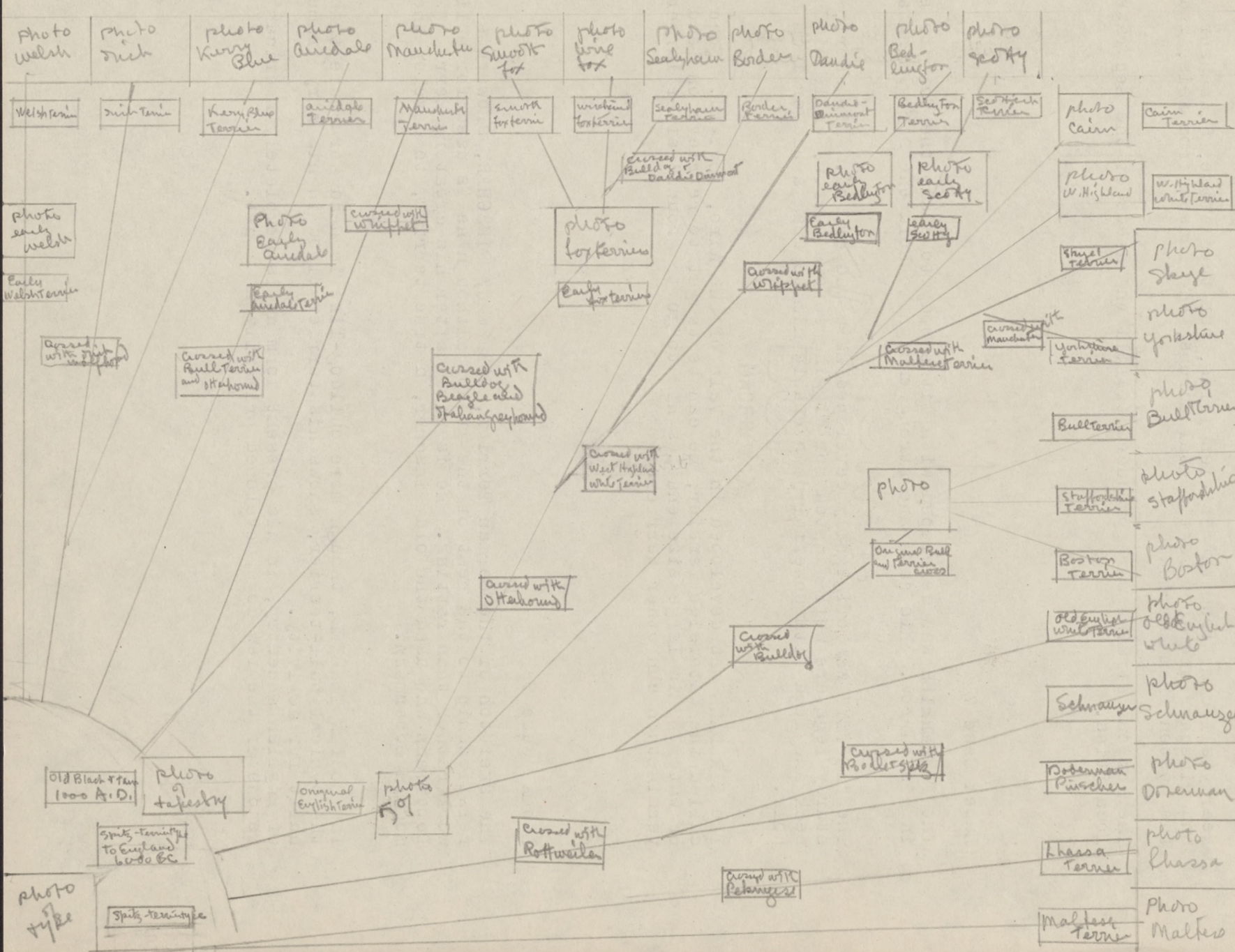
case
 7 had us
 chart
 TERRIERS

Scotty
 Airedale
 Foxterrier (mostly)

Skeletons
 and
 8x10
 photos
 in big glass
 case

Case 9 no chart
 TERRIER
 OFFSHOOTS

Dobberman
 Pinscher
 Boston Terrier
 Big glass case
 skeletons
 8x10
 photos



LABEL (which, however, was not used) Case 8

all wrong
TERRIERS - meaning "earth dogs" - were originally developed for catching weasels, foxes and rats.

Nearly all come from the British Isles, but the Matese, Schnauser and Pinscher are from continental Europe, the Lhasa from Asia, and the Boston from America.

The various strains were produced to fill the needs of the separate localities.

Labels Case 7

The FOXTERRIER was developed with lithe body to chase the fox "to earth" in his burrow. His jaws are strong enough to hold the struggling animal.

The "SCOTTY" was originally developed as a badger dog. His short, sturdy legs are well adapted for digging into a burrow, while his heavy neck and head with powerful jaws enable him to drag a badger from his hole.

The AIREDALE was developed in the Vale of the Aire, England. Once called the Waterside Terrier, he can be taught to retrieve on land or water. His large size enables him to "go to ground" after larger vermin than can other terriers.

Labels Case 9

The skeleton of the German Terrier, DOBERMAN~~P~~ PINSCHER, shows his relationship to the rest of the group, although he is used for police work rather than ratting. He is named after his creator, Herr Doberman~~n~~ who used the old Pinscher, a true terrier, to develop the modern Doberman~~n~~.

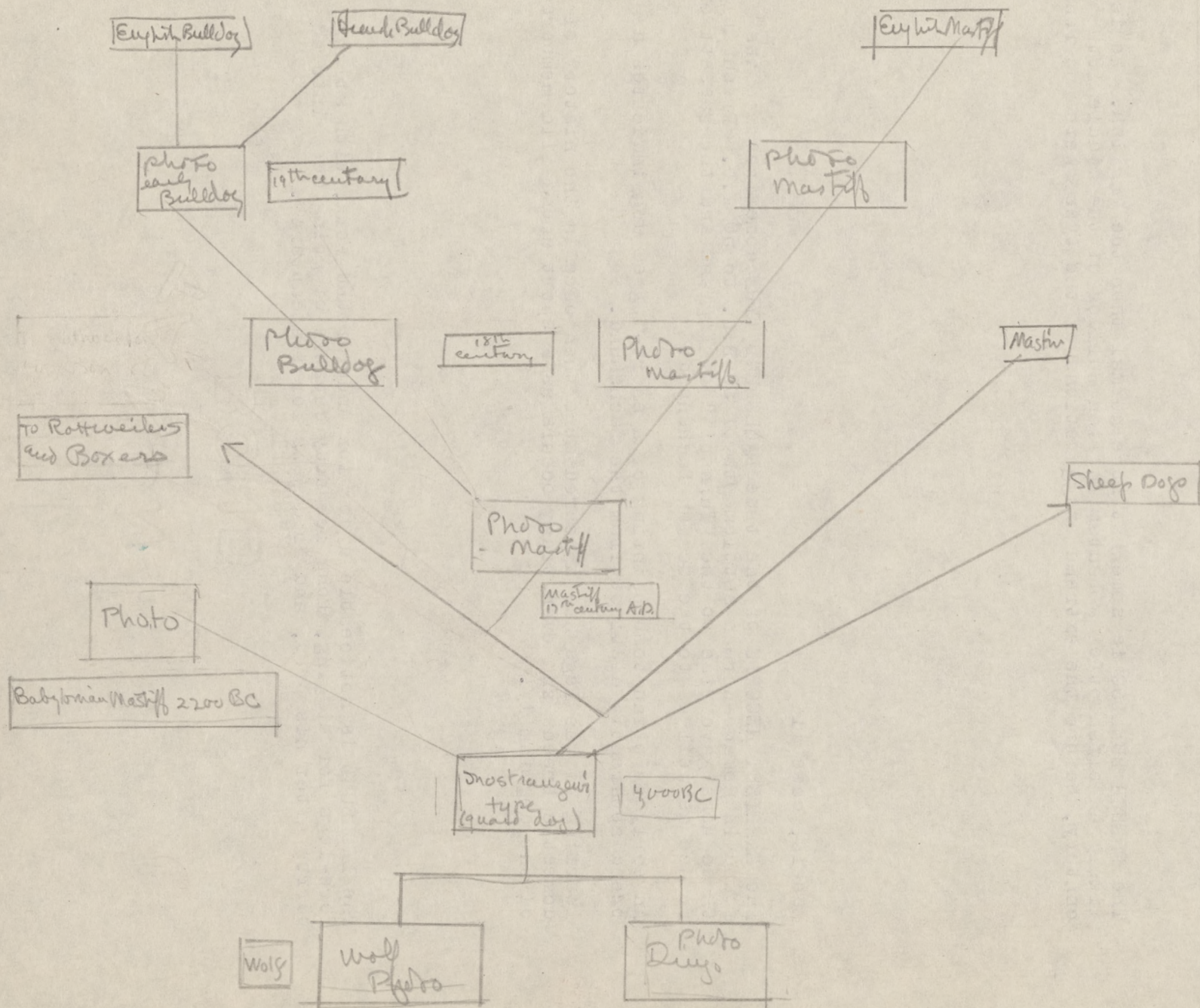
The BOSTON TERRIER, though more bulldog-like in head structure than the typical bull-terrier, shows his terrier blood in his wiry frame, built for activity.

Of English ancestry, in his present form he is completely American and is one of the few dogs developed primarily as a pet.

From Wolf & Dog Exhibit June 9, July 28, 1940

Panel 6 about 4'6" wide by 3'11 1/2" high

10 red strip on gray back
Bulldogs



accompanied by
skeleton
English Bulldog
French "
and
8x10 photos
of each
big glass case

Case 11
No chart
DACHSHUND
skeleton 18x10
photo

Short legs, bow-shaped body and undershot jaw were necessary qualities for dogs used in the sports of bull-baiting and dog-fighting in the 17th and 18th centuries.

The modern ENGLISH BULLDOG, however, is the breeders' grotesque exaggeration of these once purposeful characters, and the dog today is purely a show dog or pet.

The FRENCH BULLDOG is somewhat more normal than the English. He is likely an offshoot of a bantam English Bulldog of the middle 19th century, before the extreme exaggerations of the type were apparent.

Labels, case 11

The EARLIEST RECORDS of the true DACHSHUND TYPE come from remains found in Romano-German settlements of 50 B.C. to 50 A.D. Presumably these dogs gave rise to the "Turnspit" of England and the Bassett of France as well as to the German Dachshund.

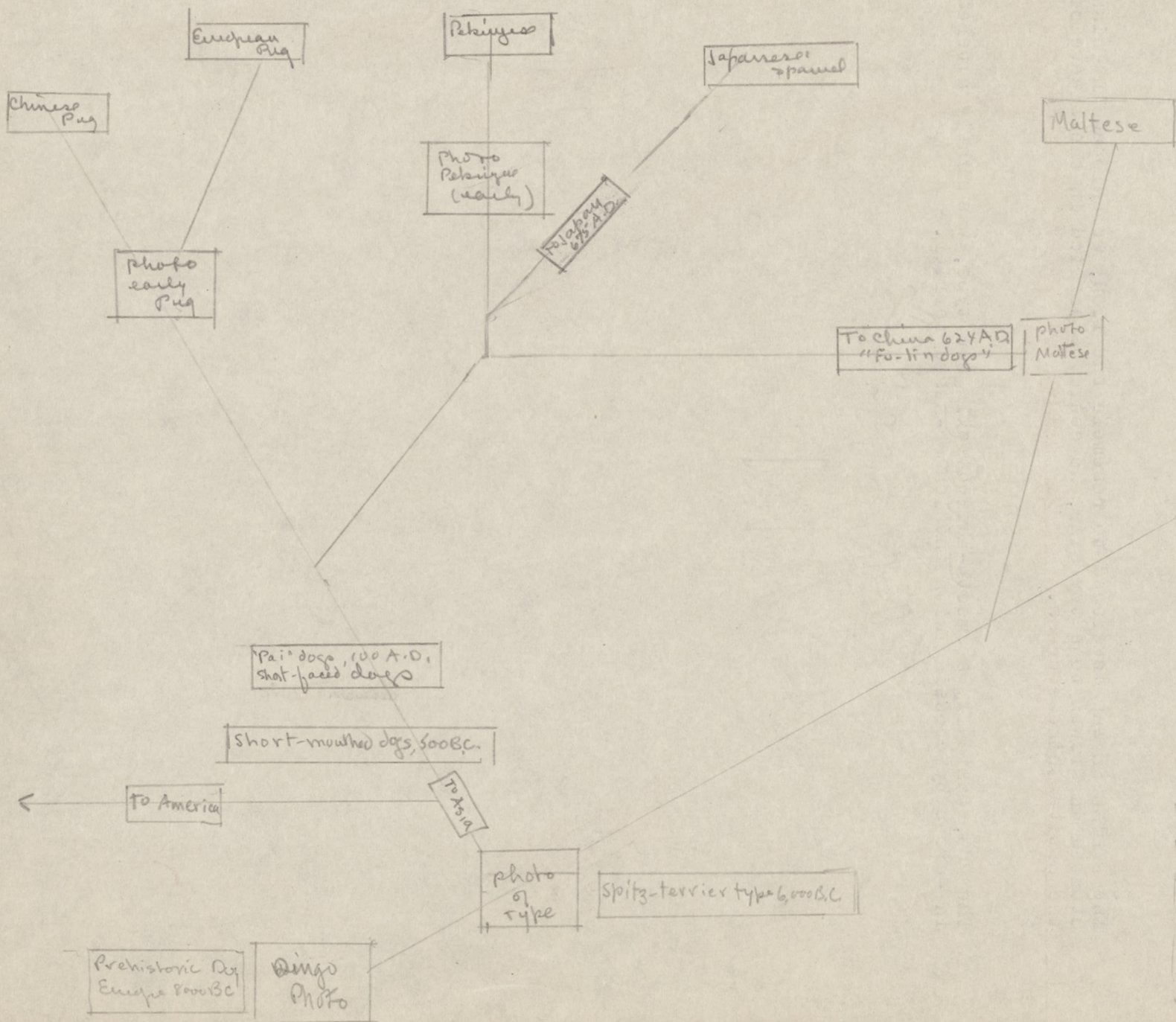
An early Egyptian tomb painting of a short-legged dog indicates a breed apparently distinct from the Dachshund.

Dwarfing of the legs has appeared more than once in the history of domestic breeds and even today occurs as a sport among wild members of the dog family.

The DACHSHUND is noticeable a dog for underground work, with strong fore-legs for digging, long low body capable of going deep into a burrow after his prey, and good jaws for its capture.

From Wolf to Dog Exhibit, June 9 - July 28, 1940
 panel 6' chart 4' 6" x

(12) red on gray back
 Chinese dog



accompanied by
 skeleton -
 Pug
 Pekingese
 8 x 10 photos
 of each
 Big glass case

LABELS

Shortening of the face has occurred more than once among dogs and is possibly associated with abnormalities of domestication. The Bulldogs of Europe, the oriental dogs, and the prehistoric short-faced dogs of Peru are distinct breeds.

The several varieties of oriental snub-nosed dogs are fundamentally alike, though of slightly differing proportions and hair.

The PEKINGESE was developed to resemble the lion, worshipped in China. Stunted in growth to a toy size, he could be carried in the sleeve of the native Chinese dress.

The PUG, basically a smooth-haired Pekingese type, was slightly altered in Europe by crossing with the longer-nosed terrier.